

# FLORA OF PANAMA

BY

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AND

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## PART VII

### Fascicle 1

PASSIFLORACEAE

CARICACEAE

LOASACEAE

BEGONIACEAE (L. B. Smith and B. G. Schubert)

CACTACEAE

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ANNALS

OF THE

MISSOURI BOTANICAL GARDEN

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# FLORA OF PANAMA

## Part VII. Fascicle 1\*

### PASSIFLORACEAE

#### 1. PASSIFLORA L.

PASSIFLORA L. Sp. Pl. 955. 1753; Killip, in Field Mus. Publ. Bot. 19:1-613. 1938.

*Granadilla* [Tourn. ex Rupp.] Adans. Fam. 2:408. 1763.

*Cieca* Medik. Malvenfam. 97. 1787.

*Murucuja* [Tourn.] Medik. loc. cit. 1787.

*Tacsonia* Juss. Gen. 398. 1789.

*Erndelia* Neck. Elem. 2:235. 1790.

*Distephana* Juss. in Ann. Mus. Paris 6:396. 1805.

*Psilanthus* Juss. loc. cit. 1805.

*Baldwinia* Raf. in Amer. Monthly Mag. 267. 1818, non Torr. & Gray.

*Astephananthes* Bory, in Ann. Gén. Sci. Phys. 2:138. 1819.

*Monactineirma* Bory, loc. cit. 1819.

*Anthactinia* Bory, loc. cit. 139. 1819.

*Polyanthes* DC. in Mém. Soc. Phys. Genève 1:435. 1822.

*Disemma* Labill. Sert. Austro-caled. 78. 1824.

*Distephia* Salisb. ex DC. Prodr. 3:335. 1828.

*Astrophea* Rchb. Consp. 132. 1828.

*Blephistelma* Raf. Fl. Tellur. 4:103. 1836.

*Macrophora* Raf. loc. cit. 1836.

*Meioperis* Raf. loc. cit. 1836.

*Tripsilina* Raf. loc. cit. 1836.

*Xerogona* Raf. loc. cit. 1836.

*Peremis* Raf. loc. cit. 104. 1836.

*Pericodia* Raf. loc. cit. 1836.

*Synactila* Raf. loc. cit. 1836.

*Odostelma* Raf. loc. cit. 1836.

*Distephania* Steud. Nom. 1:521. 1840.

*Dysosmia* Roem. Synops. Monogr. 2:149. 1846.

*Pentaria* Roem. loc. cit. 131, 187. 1846.

*Decaloba* Roem. loc. cit. 131, 152. 1846.

*Distemma* Lem. Fl. des Serres 236. 1847.

*Poggendorffia* Karst. in Linnaea 28:438. 1856.

*Rathea* Karst. Fl. Colomb. 1:77. 1859.

*Ceratosepalum* Oerst. Rech. Fl. Amér. Centr. 18. 1863.

Herbaceous or woody lianas, usually climbing by tendrils, rarely erect herbs, shrubs, or small trees. Leaves alternate, petiolate, basifixed to peltate, simple or very rarely compound, entire to deeply lobed, occasionally with large irregular glandular areas (ocellate) upon the blade; petiole frequently with few to several more or less conspicuous glands. Tendrils volubile, solitary, simple, axillary or

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produced from the inflorescence. Inflorescence axillary, usually 1-flowered, less frequently cymose and few-flowered, the peduncle jointed and there producing usually 3 inconspicuous and setaceous to large and petaloid involucre bracts. Flowers hermaphrodite, actinomorphic, frequently large and showy, perigynous. Hypanthium shallow to relatively deep, the sepals 5, valvate, usually with a corpiculate process toward the tip in the large-flowered species; petals 5, rarely absent, inserted at the margin of the hypanthium, green to highly colored; corona of numerous petaloid filaments in 1 to several centripetally decreasing series inserted on the margin of the hypanthium at the base of the corolla. Pistil and stamens borne upon a more or less elongate common androgynophore; stamens 5, borne immediately beneath the pistil, the anthers 2-celled, versatile; pistil 3- or very rarely 4-carpellate, the ovary 1-loculate with 3 or very rarely 4 parietal placentas bearing numerous ovules, the 3-4 stigmas usually quite sessile, rather elongate, radial. Fruit an inflated berry, frequently large, globose to fusiform, containing numerous small hard lenticular seeds immersed in abundant mucilaginous pulp derived from the testa.

Although the Passifloraceae include a few small genera of the Old World as well, the large genus *Passiflora* is confined to the Americas in its indigenous distribution, although numerous species with showy flowers and edible fruits have been introduced into the tropics of the Eastern Hemisphere and are frequently cultivated in greenhouses in the colder latitudes. In America native species are found from the south-central United States to Argentina.

Their extremely complicated and frequently large and brightly colored flowers have attracted several botanists to the special study of the Passifloras, the most recent of whom is E. P. Killip. In his study of *Passiflora*, Killip recognizes 353 species which are distributed amongst no less than 22 subgenera, chiefly based upon rather intricate differences in flower structure. Twenty-six species have been discovered in Panama to which at least a few additions undoubtedly will be made in the future. The present account has been drawn very largely from that of Killip's monumental work, although the keys are original and the species concept has been changed in a few minor instances. The authors of this Flora are grateful to Mr. Killip for the generous cooperation which he has given them in the naming of their study material over many years.

Early Spanish missionaries to the New World saw in the radiant flowers of *Passiflora* a symbol of the Crucifixion, and from this inspiration the Spanish popular name *pasionaria* and the English "Passionflower" have had their origin. Less reverent Spanish names of frequent application to various species are *calzoncillo* and *ala de murciélago*. The large pulpy berries of various species, particularly the frequently cultivated *P. edulis* and *P. quadrangularis* are known as *granadillas* and are eaten raw or more often cooked with milk to make a kind of dessert.

- a. Flowers typically rather small, mostly less than 5 cm. in diameter, usually paired or several at the nodes (usually solitary in *P. punctata*); sepals not corpiculate toward the tip; bracts small and setose, very inconspicuous; petiolar glands usually 2 when present.



- b. Flowers 2 upon a common elongate peduncle, the associated tendril terminal; plants glabrous and very glaucous; leaves small, suborbicular, entire or nearly so; petiole with 2 foveate glands at the juncture with the blade..... 1. *P. TRYPHOSTEMMATOIDES*
- bb. Flowers 1 or several upon paired (occasionally solitary) peduncles, the associated tendril basal.
- c. Petioles eglandular.
- d. Flowers few or several upon each peduncle; plants densely pubescent..... 2. *P. SEXFLORA*
- dd. Flowers solitary upon each peduncle; plants glabrous or very inconspicuously pubescent.
- e. Leaves basifixed; stipules minute and setose.
- f. Peduncles jointed at about the middle or somewhat below; flowers usually paired at the nodes..... 3. *P. BIFLORA*
- ff. Peduncles jointed far above the middle, almost directly beneath the flower.
- g. Leaves about twice as long as broad or nearly so, very broadly 3-lobed with the central lobe stronger, occasionally nearly entire; flowers usually paired at the nodes..... 4. *P. LANCEARIA*
- gg. Leaves about as broad as long; flowers usually paired at the nodes.
- h. Leaves with 2 strongly ascending lateral lobes, rarely with a weak central lobe; petals absent..... 5. *P. APETALA*
- hh. Leaves about equally 3-lobed; petals present..... 6. *P. PANAMENSIS*
- egg. Leaves much broader than long, with 2 nearly transverse lateral lobes; flowers usually solitary at the nodes..... 7. *P. PUNCTATA*
- ee. Leaves eccentrically peltate, entire or if 3-lobed the central lobe far stronger; stipules large and foliaceous, amplexicaul, ciliate-serrate, deciduous. .... 8. *P. HAHNII*
- cc. Petioles glandular.
- d. Leaves eccentrically peltate, deeply 3-lobed, the lateral lobes nearly transverse and as strong as the central to much stronger; stipules inconspicuous and subsetaceous..... 9. *P. CORIACEA*
- dd. Leaves basifixed.
- e. Flowers typically 2 or more upon a short common peduncle; leaves broadly 3-lobed, the lobes rounded, occasionally mucronulate, the central far stronger; petiolar glands inconspicuous, broadly poculiform..... 10. *P. HOLOSERICEA*
- ee. Flowers solitary upon each peduncle; leaf lobes acute to acuminate; petiolar glands conspicuously elevated.
- f. Leaves entire or subentire with the lateral lobes reduced to inconspicuous angles; petiolar glands very large and auricular, borne toward the base of the petiole..... 11. *P. AURICULATA*
- ff. Leaves definitely 3-lobed; petiolar glands rather inconspicuous, borne about midway or higher upon the petiole.
- g. Petiolar glands borne about midway upon the petiole; petals present, linear..... 12. *P. PEDICULATA*
- gg. Petiolar glands borne almost directly beneath the leaf blade; petals absent..... 13. *P. SUBEROSA*
- aa. Flowers typically rather large, mostly more than 5 cm. in diameter, solitary at the nodes (except occasionally in *P. adenopoda*); sepals usually conspicuously corniculate toward the tip (except in *P. pulchella* and *P. membranacea*); bracts conspicuous and involucre, foliaceous or petalaceous; petiolar glands usually more than 2 when present.
- b. Involucral bracts entire, serrulate, or simply lacerate.
- c. Sepals not corniculate; petioles not glandular.
- d. Leaves cuneately 2-lobed, occasionally with a small central lobe; stipules inconspicuous and subsetaceous; involucral bracts obovate, obtuse or acute at the base, 1.0-1.5 cm. long; flowers about 4-6 cm. in diameter..... 14. *P. PULCHELLA*
- dd. Leaves suborbicular, indistinctly 3-lobed; stipules conspicuously foliaceous; involucral bracts suborbicular, deeply cordate, about 3-5 cm. long; flowers about 7-8 cm. in diameter..... 15. *P. MEMBRANACEA*
- cc. Sepals corniculate; petioles glandular.

- d. Leaves palmately 3- to 7-parted to below the middle, the central lobe somewhat contracted toward the base.
- e. Involucral bracts much shorter than the sepals, free and never enveloping the flower bud, serrate or lacerate.
  - f. Leaves 5- to 7-lobed (very rarely 3-lobed) petiolar glands very large and prominently stipitate, borne almost directly beneath the leaf blade; involucral bracts lacerate; flowers purple and white..... 16. *P. ADENOPODA*
  - ff. Leaves 3-lobed; petiolar glands inconspicuous and sessile, borne toward the base of the petiole; involucral bracts glandular-serrulate; flowers scarlet and yellow..... 17. *P. VITIFOLIA*
- ee. Involucral bracts almost as long as the sepals, united toward the base and completely enveloping the flower bud, entire; flowers violet and white..... 18. *P. WILLIAMSHII*
- dd. Leaves entire, or palmately 3-lobed above or about the middle and with the central lobe not constricted toward the base.
  - e. Leaves 3-lobed.
    - f. Plants more or less pilose; leaves lobed above the middle, the central lobe much stronger; petioles with 2 to several pairs of glands; involucral bracts rather narrowly lanceolate, foliaceous..... 19. *P. MENISPERMIFOLIA*
    - ff. Plants glabrous; leaves lobed to about the middle, the 3 lobes subequal; petioles with 1 pair of glands; involucral bracts broadly ovate, somewhat petalaceous..... 20. *P. SUBPELTATA*
  - ee. Stipules very conspicuously foliaceous.
    - g. Stipules equilateral, deciduous; involucral bracts about as long as the sepals.
      - h. Stems not winged; leaves deeply cordate; petioles with filiform glands..... 21. *P. LIGULARIS*
      - hh. Stems prominently winged; leaves rounded at the base to obscurely cordate; petioles with ovoid glands..... 22. *P. QUADRANGULARIS*
    - gg. Stipules strongly inequilateral, persistent; involucral bracts about half as long as the sepals..... 23. *P. OERSTEDII*
    - ff. Stipules inconspicuous and subsetaceous or barely foliaceous.
      - g. Leaves obtuse or very slightly cordate at the base; involucral bracts free.
        - h. Leaves entire; petioles glandular at the middle or below; flowers maroon, purple and white..... 24. *P. AMBIGUA*
        - hh. Leaves serrate or serrulate; petioles glandular above the middle; flowers white and purple..... 25. *P. NITIDA*
      - gg. Leaves deeply cordate at the base; petioles glandular directly beneath the leaf blade; involucral bracts united at the base; flowers purple and white..... 26. *P. SEEMANNII*
  - bb. Involucral bracts complexly 2- or 3-pinnatifid, each filiform division gland-tipped; plants hirsutulose; petioles with scattered gland-tipped hairs; flowers greenish white more or less tinged with purple..... 27. *P. FOETIDA*

Other species, at present known from Costa Rica and Colombia, are to be expected in Panama as well.

1. *PASSIFLORA TRYPHOSTEMMATOIDES* Harms, in Engl. Bot. Jahrb. 18: Beibl. 46:6. 1894; Killip, in Field Mus. Publ. Bot. 19:81. 1938.

*Passiflora gracilimma* Killip, in Journ. Wash. Acad. Sci. 14:112. fig. 2b. 1924.

Plants slender, climbing, glabrous and very glaucous throughout. Leaves long-petiolate, simple, entire, suborbicular, about 1.5-4 cm. long and 1.5-3.0 cm. broad, very pale beneath, darker above; petioles very slender, about 1-2 cm. long, bearing 2 rather inconspicuous foveate glands at the juncture with the leaf blade; stipules setose, very inconspicuous. Inflorescence of 2 greenish white flowers upon an

elongate common peduncle, the associated tendril terminal; peduncle 0.5–4.5 cm. long; pedicels 1.5–4.0 cm. long, jointed somewhat above the middle, the bracts minutely setose, deciduous. Flowers 1.5–4.0 cm. in diameter; sepals oblong, about 0.7–1.5 cm. long, not corniculate; petals narrowly oblong, 0.5–1.0 cm. long; filaments of the corona in a single series, filiform, 3–5 mm. long. Berry subglobose to ovoid, 3–6 cm. long, greenish yellow.

Panama and Colombia, in wet forests of middle elevations.

BOCAS DEL TORO: Fish Creek Hills, Von Wedel 2421, 380. CHIRIQUÍ: exact locality uncertain, Hart 104.

There seems to be little room for doubt that *P. tryphostemmatoides* and *P. gracilimma* are conspecific (cf. Killip, in Field Mus. Publ. Bot. 19:82. 1838), since they are not closely related to other species, their characters overlap or at least intergrade, and both have been reported from closely adjacent stations both in Panama and Colombia. No intermediate stations between Bocas del Toro (probably Hart's "Chiriquí") and the Atrato valley in Colombia have been discovered as yet, but they are to be expected since the Caribbean coast of Panama still is known so poorly.

2. *PASSIFLORA SEXFLORA* Juss. in Ann. Mus. Hist. Nat. 6:110. pl. 37. fig. 2. 1805; Killip, in Field Mus. Publ. Bot. 19:129. 1938.

*Passiflora pannosa* J. E. Sm. in Rees, Cycl. 20: *Passiflora* no. 28. 1819.

*Passiflora capsularis* var. *geminiflora* DC. Prodr. 3:325. 1828 (as *geminifolia*).

*Meioperis pannosa* (J. E. Sm.) Raf. Fl. Tellur. 4:103. 1838.

*Cieca pannosa* (J. E. Sm.) M. Roem. Fam. Nat. Syn. 2:148. 1846.

*Decaloba sexflora* (Juss.) M. Roem. loc. cit. 164. 1846.

*Passiflora floribunda* Lem. Fl. des Serres 4:335b. 1848.

*Passiflora triflora* Macf. Fl. Jam. 2:149. 1850.

*Passiflora miraflorensis* Killip, in Journ. Wash. Acad. Sci. 14:109. 1924.

*Passiflora isotriloba* Cuf. Archivio Bot. 9:196. 1933.

Plants rather slender, climbing, densely pubescent throughout. Leaves petiole, simple, basifixed, subtrapezoid, the top saliently and acutely 2-lobed, occasionally with a smaller central lobe, the base rounded or slightly cordate, 3–9 cm. long, 4–10 cm. broad; petioles 1–3 cm. long, eglandular; stipules subulate, about 5 mm. long. Inflorescence bearing 2–10 greenish-white, purple-tinged flowers upon a common peduncle 2–3 cm. long, the associated tendril basal; pedicels 1.0–1.5 cm. long, subtended by an inconspicuous subulate bract. Flowers 2–3 cm. in diameter; sepals oblong-lanceolate, 8–15 mm. long, not corniculate; petals linear, about 10 mm. long; filaments of the corona in 2 series, the outer about as long as the petals. Fruit subglobose, 5–10 mm. in diameter, greenish yellow.

Southern Florida; Mexico to northern Colombia; Greater Antilles. Clearings in wet forests, 1300–2000 m. in Panama.

BOCAS DEL TORO: Robalo Trail, northern slopes of Cerro Horqueta, Allen 4928. CHIRIQUÍ: Bajo Mono, Boquete District, Davidson 491; vicinity of Bajo Mona and Quebrada Chiquero, Woodson & Schery 519; valley of the upper Río Chiriquí Viejo, vicinity of Monte Lirio, Seibert 180; Río Ladrillo, above El Boquete, Pittier 3286.



Fig. 1. *Passiflora sexflora*

3. *PASSIFLORA BIFLORA* Lam. Encycl. 3:36. 1789; Killip, in Field Mus. Publ. Bot. 19:185. 1938.

*Passiflora lunata* J. E. Sm. Icon. Pl. Rar. 11: pl. 1. 1790, non Juss. nec Vell. necque Poepp. & Endl.

*Passiflora glabrata* HBK. Nov. Gen. & Sp. 2:135. 1817.

*Cieca glabrata* (HBK.) M. Roem. Fam. Nat. Syn. 2:143. 1846.

*Decaloba biflora* (Lam.) M. Roem. loc. cit. 2:161. 1846.

*Decaloba biflora* var. *major* M. Roem. loc. cit. 1846.

*Decaloba biflora* var. *mexicana* M. Roem. loc. cit. 1846.

*Passiflora lunata* var. *costata* Mast. in Mart. Fl. Bras. 13<sup>1</sup>:552. 1872.

*Passiflora spatbulata* Mast. loc. cit. 1872.

*Passiflora brighami* S. Wats. in Proc. Amer. Acad. 21:473. 1887.

*Passiflora transversa* Mast. in Bot. Gaz. 16:7. 1891.

Plants rather slender, climbing, essentially glabrous throughout, the stems conspicuously striate. Leaves rather shortly petiolate, simple, basifixed, subtrapezoid, the top saliently and obtusely 2-lobed, occasionally with a smaller central lobe or mucro, the base obtuse to broadly rounded, 1-10 cm. long, 5-10 cm. broad, conspicuously glandular-ocellate; petioles 0.5-3.0 cm. long eglandular; stipules minutely setose. Inflorescences bearing solitary greenish white or yellow flowers upon paired peduncles, the associated tendril basal; peduncles about 1.0-1.5 cm. long, jointed at about the middle or somewhat below; bracts very inconspicuous, subsetaceous. Flowers 3-4 cm. in diameter; sepals ovate-lanceolate, about 1 cm. long, not corniculate; petals oblong-lanceolate, slightly shorter than the sepals; filaments of the corona in 2 series, the outer about as long as the petals. Fruit subglobose, 1-2 cm. in diameter, greenish yellow.

Mexico to Colombia and Venezuela; Bahamas; from near sea level to about 1,500 m. Widely distributed and common in Panama.

BOCAS DEL TORO: Shepherd Island, Von Wedel 2694, 2737; Water Valley, Von Wedel 998, 1697; Snapper Point, Von Wedel 2645; vicinity of Chiriquí Lagoon, Von Wedel 384, 1218, 1305. CANAL ZONE: Ancón Hill, Woodson, Allen & Seibert 716; Chagres, Fendler 121; Ancón, Pittier 2578, Standley 12107; Culebra, Pittier 2091, Standley 25982; Empire to Mandinga, Piper 5520; Fort Sherman, Standley 31040, 31184, Stevens 1046; Frijoles, Piper 5806; Barro Colorado Island, Bailey & Bailey 311, Wetmore & Abbe 140, Woodworth & Vestal 307. CHIRIQUÍ: El Boquete, Killip 3608; David, Killip 3640. COCLÉ: Penonomé, Williams 226. COLÓN: Porto Bello, Pittier 2461; Catival, Standley 30349. PANAMÁ: Panamá Vieja to Bella Vista, Allen 826; Las Sabanas, Standley 25835; Taboga Island, Standley 27844, Pittier 3607; San José Island, Erlanson 183, 219, Johnston 809, 1189, 549; Tumba Muerto Road near Panamá, Standley 29802; Trapiche Island, Miller 1893; Taboguilla Island, Miller 2011.

Popular names of this weedy climber are *guate-guate*, *camacarlatá*, and *calzoncillo*.

4. *PASSIFLORA LANCEARIA* Mast. in Journ. Bot. 23:114. 1885; Killip, in Field Mus. Publ. Bot. 19:160. 1938.

*Passiflora talamancensis* Killip, in Journ. Wash. Acad. Sci. 12:260. 1922.

Rather massive climbers, essentially glabrous throughout. Leaves rather long-petiolate, simple, basifixed, oblong-elliptic and entire to the tip or very broadly

3-lobed with the central lobe stronger than the lateral, obtuse to rounded at the base, 5–12 cm. long, 2–9 cm. broad, membranaceous to subcoriaceous, rather conspicuously glandular-ocellate; petioles 1–4 cm. long, eglandular; stipules subsetaceous, inconspicuous. Inflorescences bearing solitary greenish-white, faintly purple-tinged flowers upon usually paired peduncles, the associated tendril basal; peduncles about 2–5 cm. long, jointed far above the middle almost directly beneath the flower; bracts inconspicuously subsetaceous. Flowers 3–4 cm. in diameter; sepals ovate-lanceolate, 1.0–1.5 cm. long, not corniculate, glabrous to more or less puberulent within; petals about half to one third as long as the sepals; filaments of the corona in 2 series, the outer about as long as the petals. Fruit subglobose, 2–3 cm. in diameter.

Costa Rica and Panama, from near sea level to about 1,700 m. altitude.

BOCAS DEL TORO: Old Bank Island, *Von Wedel 2120*. CHIRIQUÍ: Bajo Chorro, Boquete District, *Davidson 336*.

This is a representative of a very complex group of species the affinities of which are far from clear. Perhaps our plants should be referred to *P. mollis* HBK.

5. *PASSIFLORA APETALA* Killip, in Journ. Wash. Acad. Sci. 12:255. 1922.

Plants rather slender, climbing, glabrous throughout. Leaves rather long-petiolate, simple, basifixed, broadly cuneate-subtrapezoid, with 2 strongly ascending lateral lobes, rarely with a weak central lobe, broadly obtuse or rounded at the base, 3–10 cm. long and broad, inconspicuously glandular-ocellate; petioles 1–5 cm. long, eglandular; stipules minute and subsetaceous. Inflorescences bearing solitary yellowish green flowers upon paired peduncles, the associated tendril basal; peduncles about 1.5–4.0 cm. long, jointed above the middle; bracts inconspicuous and subsetaceous. Flowers about 2 cm. in diameter; sepals narrowly oblong-lanceolate, about 1 cm. long, not corniculate; petals absent; filaments of the corona in 1 series, about half as long as the sepals or less. Fruit globose, about 1 cm. in diameter, dark purple.

Costa Rica and Panama, in clearings of forests at 1,000–2,000 m.

CHIRIQUÍ: trail from Bambito to Cerro Punta, *Allen 316*; Chiquero, *Davidson 511*; Bajo Mona, mouth of Quebrada Chiquero, *Woodson, Allen & Seibert 1016*; Bajo Mona and Quebrada Chiquero, *Woodson & Schery 583*; vicinity of "New Switzerland", central valley of Río Chiriquí Viejo, *Allen 1346*; valley of upper Río Chiriquí Viejo, vicinity of Monte Lirio, *Seibert 160*, *G. White 25*; Alto Lino, *Bro. Maurice 835*.

6. *PASSIFLORA PANAMENSIS* Killip, in Journ. Wash. Acad. Sci. 12:259. 1922.

Plants rather slender, climbing, glabrous throughout. Leaves long-petiolate, simple, basifixed, broadly 3-lobed, the lobes ascending, acute, and essentially equal, broadly rounded at the base, 5–12 cm. long and broad, conspicuously glandular-ocellate; petioles 1.5–3.0 cm. long, eglandular; stipules inconspicuous and subsetaceous. Inflorescences bearing solitary greenish lavender-tinged flowers upon paired peduncles, the associated tendril basal; peduncles 2–4 cm. long, jointed almost immediately beneath the flower; bracts minute, subsetaceous. Flowers about



3 cm. in diameter; sepals oblong-lanceolate, 1.0–1.5 cm. long; petals oblanceolate, about half as long as the sepals; filaments of the corona in 2 series, the outer about as long as the petals. Fruit globose, about 2 cm. in diameter, purple.

Eastern Panama and adjacent Colombia, in lowland forests.

DARIÉN: along Sambú River, *Pittier* 5556.

7. *PASSIFLORA PUNCTATA* L. Sp. Pl. 957. 1753; Killip, in Field Mus. Publ. Bot. 19:183. 1938.

*Passiflora misera* HBK. Nov. Gen. & Sp. 2:136. 1817.

*Passiflora maximiliana* Bory, in Ann. Gen. Sci. Phys. Brux. 2:149. pl. 24. 1819.

*Passiflora vespertilio* Ker, Bot. Reg. 7: pl. 597. 1821, non L.

*Passiflora discolor* Link & Otto, Icon. Pl. Select. 13: pl. 5. 1828.

*Passiflora retusa* Hook. Bot. Misc. 3:325. 1833.

*Decaloba punctata* (L.) M. Roem. Fam. Nat. Syn. 2:156. 1846.

*Cieca discolor* (Link & Otto) M. Roem. loc. cit. 140. 1846.

*Cieca misera* (HBK.) M. Roem. loc. cit. 1846.

*Passiflora microcarpa* Mast. in Mart. Fl. Bras. 13<sup>1</sup>:556, 593. 1872.

*Passiflora laticaulis* Killip, in Journ. Wash Acad. Sci. 14:110. 1924.

*Passiflora translinearis* Rusby, in Ann. N. Y. Bot. Gard. 7:309. 1927, in part.

*Passiflora longilobis* Hoehne, in Linh. Telegr. Matto Grosso, Annex. 5: Bot. 1:71. pl. 63. 1910.

Slender climbers, glabrous or essentially so. Leaves petiolate, simple, basifixed, much broader than long, with 2 nearly transverse lateral lobes and usually a slender central mucro or rarely a small central lobe, 0.5–3.0 cm. long, 3–10 cm. broad, conspicuously glandular-ocellate; petioles 1–6 cm. long, eglandular; stipules minute and subsetaceous. Inflorescence usually solitary and bearing a single greenish white, occasionally purple-tinged flower, the associated tendril basal; peduncle 3–10 cm. long, jointed almost immediately beneath the flower; bracts inconspicuous and setaceous. Flowers about 2–4 cm. in diameter; sepals ovate-lanceolate, 1–2 cm. long; petals narrowly oblong, 8–12 mm. long; filaments of the corona in 2 series, the outer almost equaling the petals. Fruit globose, 1.0–1.5 cm. in diameter, purple.

Panama to Argentina, at low elevations in thickets and forest clearings.

CANAL ZONE: Barro Colorado Island, *Woodworth & Vestal* 457, 717, *Bailey & Bailey* 258, *Kenoyer* 456, *Wetmore & Abbe* 26, *Bangham* 574, *Hunnewell* 19029; Monte Lirio, *Maxon* 6841; between Frijoles and Monte Lirio, *Killip* 12187; Trinidad River, *Pittier* 3998. PANAMÁ: *Mindi*, *Cowell* 169; Río Mindi, *Sutton Hayes* 596; *Baillemona*, *Stevens* 687.

It is questionable whether *P. misera* can be maintained as a species distinct from *P. punctata* since their general aspect, variational tendency, and geographical distribution have so very much in common. They were kept separate by Killip, however, who was of the opinion that the inner corona filaments are linear, broadly dilated at the apex and often lobulate in *P. misera* and filiform or capillary, rarely minutely capitate in *P. punctata*.

8. *PASSIFLORA HAHNII* (Fourn.) Mast. in Mart. Fl. Bras. 13<sup>1</sup>:569. 1872.

*Disemma Hahnii* Fourn. in Rev. Hort. 41: pl. 430. 1869.

*Passiflora guatemalensis* S. Wats. in Proc. Amer. Acad. 22:473. 1887.

Rather slender climbers, glabrous throughout. Leaves petiolate, simple, very eccentrically peltate, broadly ovate, essentially entire or if 3-lobed the central lobe far stronger and the lateral relatively inconspicuous, the base truncate or broadly rounded, 5–8 cm. long and broad; petioles 2–3 cm. long, eglandular; stipules large and foliaceous, inequilaterally reniform, amplexicaul, ciliate-serrate, about 1 cm. long and 2 cm. broad, deciduous. Inflorescences bearing solitary yellowish-white flowers upon paired or solitary peduncles, the associated tendril basal; peduncles 1.5–2.0 cm. long, jointed almost immediately beneath the flower; bracts minute and subulate. Flowers about 4–6 cm. in diameter; sepals oblong, 2–3 cm. long, not corniculate; petals similar to the sepals; filaments of the corona in 2 series, the outer about 1.5 cm. long. Fruit globose, 3–4 cm. in diameter, deep purple.

Southern Mexico to Colombia, at low to middle elevations.

COCLÉ: mountains beyond La Pintada, 400–600 m., *Hunter & Allen 629*.

9. *PASSIFLORA CORIACEA* Juss. in *Ann. Mus. Hist. Nat.* 6:109. *pl.* 39, *fig.* 2. 1805; Killip, in *Field Mus. Publ. Bot.* 19:83. 1938.

*Passiflora difformis* HBK. *Nov. Gen. & Sp.* 2:136. 1817.

*Passiflora clypeata* J. E. Sm. in *Rees, Cycl.* 26: *Passiflora* no. 20. 1819.

*Monactineirma coriacea* (Juss.) Bory, in *Ann. Sci. Gén. Phys. Brux.* 2:138. 1819.

*Cieca difformis* (HBK.) M. Roem. *Fam. Nat. Syn.* 2:140. 1846.

*Cieca coriacea* (Juss.) M. Roem. *loc. cit.* 148. 1846.

*Passiflora sexocellata* Schlecht. in *Linnaea* 27:521. 1854.

*Passiflora obtusifolia* Sessé & Moc. *pl. Nov. Hisp.* 156. 1887.

Rather extensive climbers inconspicuously puberulent to glabrate. Leaves petiolate, simple, very eccentrically peltate, deeply 3-lobed, the lateral lobes rather abruptly acuminate and nearly transverse, as strong as the central lobe to much stronger, 3–7 cm. long, 6–25 cm. broad; petioles 2–4 cm. long, bearing 2 ocellate glands near the juncture with the leaf blade; stipules narrowly linear, about 0.5 cm. long. Inflorescence a terminal 2- to several-flowered raceme, with slightly foliaceous, frequently 3-lobed bracts subtended by paired ocellate glands; pedicels about 5 mm. long. Flowers 2.5–3.5 cm. in diameter, greenish or yellowish white; sepals oblong-lanceolate, 1.0–1.5 cm. long, not corniculate; petals none; filaments of the corona in 2 series, the outermost 7–8 mm. long. Fruit globose, 1–2 cm. in diameter, deep blue.

Mexico to British Guiana and Bolivia, from near sea level to about 2,000 m.

CANAL ZONE: Cocoli Island, *Miraflores Lake*, *P. White 86*, *G. White 133*; *Las Cascadas*, *Standley 29594*; *Darién Station*, *Standley 31617*; *Empire to Mandinga*, *Piper 5479*; *Barro Colorado Island*, *Shattuck 57*, *Woodworth & Vestal 501*. COCLÉ: *El Valle de Antón*, *Allen 1667*, *4473*. PANAMÁ: *Alhajuela*, *Pittier 3456*.

In some parts of Central America this species is known as *murciélago* and *ala de murciélago* with reference to the peculiar shape of the leaves.



10. *PASSIFLORA HOLOSERICEA* L. Sp. Pl. 958. 1753; Killip, in Field Mus. Publ. Bot. 19:99. 1938.

*Decaloba holosericea* (L.) M. Roem. Fam. Nat. Syn. 2:164. 1846.

Rather coarse climbers, densely puberulent throughout. Leaves petiolate, simple, basifixed, broadly 3-lobed, the lobes rounded and occasionally mucronulate, the central lobe far stronger, the base rounded to somewhat cordate, 5-10 cm. long, 4-8 cm. broad; petioles 1-3 cm. long, the glands rather inconspicuous and broadly poculiform; stipules inconspicuous and filiform. Inflorescences usually paired, corymbiform, typically bearing 2 or more greenish white or yellow flowers upon a very short common peduncle, the associated tendril basal; common peduncles 2-4 mm. long; pedicels about 1 cm. long; bracts inconspicuous and filiform. Flowers about 2-4 cm. in diameter, sepals oblong-elliptic, about 1.5 cm. long; petals broadly elliptic, about 1 cm. long; filaments of the corona in 2 series, the outer nearly as long as the petals, flushed with yellow and purple. Fruit globose, about 1.5 cm. in diameter.

Southern Mexico to Colombia and Venezuela; Cuba. Lowland thickets to about 700 m.

CHIRIQUÍ: vicinity of Puerto Armuelles, Woodson & Schery 816.

11. *PASSIFLORA AURICULATA* HBK. Nov. Gen. & Sp. 2:131. 1817; Killip, in Field Mus. Publ. Bot. 19:122. 1938.

*Passiflora appendiculata* G. F. W. Mey. Prim. Fl. Esseq. 223. 1818.

*Passiflora cyathophora* Desv. in Ham. Prodr. 48. 1825.

*Passiflora Robrii* DC. Prodr. 3:326. 1828.

*Passiflora cinerea* Poepp. & Endl. Nov. Gen. & Sp. 2:57. pl. 177. 1838.

*Cieca auriculata* (HBK.) M. Roem. Fam. Nat. Syn. 2:143. 1846.

*Cieca appendiculata* (G. F. W. Mey.) M. Roem. loc. cit. 145. 1846.

*Cieca cinerea* (Poepp. & Endl.) M. Roem. loc. cit. 148. 1846.

*Decaloba Robrii* (DC.) M. Roem. loc. cit. 156. 1846.

*Decaloba cyathophora* (Desv.) M. Roem. loc. cit. 157. 1846.

*Passiflora Kegeliana* Garcke, in Linnaea 22:60. 1849.

*Passiflora torta* Mast. in Mart. Fl. Bras. 13<sup>1</sup>:548. 1872.

*Passiflora cayaponioides* Rusby, in Bull. N. Y. Bot. Gard. 8:107. 1912.

*Passiflora cryptopetala* Hoehne, in Comm. Linh. Telegr. Matto Grosso Ann. Bot. 5:76. pl. 112. 1915.

Rather coarse climbers, finely puberulent when young, becoming glabrate. Leaves petiolate, simple, basifixed, broadly ovate to ovate-lanceolate, entire or sub-entire with the lateral lobes reduced to inconspicuous angles, 4-15 cm. long, 2-10 cm. broad, conspicuously ocellate; petioles 1-3 cm. long, bearing 2 very large and auriculate glands near the base; stipules setaceous, up to about 1 cm. long. Inflorescences in pairs, bearing a single greenish yellow, purple-tinged flower; peduncle about 1 cm. long, jointed above the middle; bracts inconspicuous and setose. Flowers about 2 cm. in diameter, greenish yellow or white and purple-tinged toward the base; sepals narrowly oblong-lanceolate, about 1 cm. long, not corniculate; petals linear, about half as long as the sepals; filaments of the corona in 2 series, the outer about as long as the sepals. Fruit globose, 1.0-1.5 cm. in diameter, greenish yellow.

Nicaragua to Bolivia and Brazil, from about sea level to 1,200 m.

BOCAS DEL TORO: vicinity of Chiriquí Lagoon, *Von Wedel 1202*; Water Valley, *Von Wedel 1703*. CANAL ZONE: Chagres, *Fendler 122*; Gatún, *Sutton Hayes 463*; Agua Clara, Ft. Sherman, *Standley 30949*; Agua Clara Reservoir, *Stevens 595*; Barro Colorado Island, *Standley 41026*, *Zetek 4364*. DARIÉN: Cana, *Williams 964*.

12. *PASSIFLORA PEDICULATA* Mast. in Bot. Gaz. 23: 247. 1897; Killip, in Field Mus. Publ. Bot. 19:113. 1938.

Rather coarse climbers, glabrous throughout. Leaves petiolate, simple, basifixed, broadly 3-lobed, the central lobe stronger, more or less deeply cordate at the base, 4-9 cm. long, 5-10 cm. broad, inconspicuously ocellate; petioles 1.5-5.0 cm. long, rather inconspicuously glandular about midway or above; stipules inconspicuous and subsetose. Inflorescences solitary or paired, bearing solitary greenish yellow or white, purple tinged flowers; peduncles about 2-4 cm. long, jointed about midway; bracts inconspicuous and subsetaceous. Flowers about 3 cm. in diameter; sepals oblong-lanceolate, about 1.5 cm. long, not corniculate; petals linear, about 1 cm. long; filaments of the corona in 1 series, somewhat shorter than the petals. Fruit not seen.

Costa Rica and western Panama, near sea level to about 1,500 m.

BOCAS DEL TORO: Water Valley, *Von Wedel 854*.

13. *PASSIFLORA SUBEROSA* L. Sp. Pl. 958. 1753; Killip, in Field Mus. Publ. Bot. 19:88. 1938.

*Passiflora pallida* L. loc. cit. 1753.  
*Passiflora hirsuta* L. loc. cit. 958. 1753.  
*Passiflora minima* L. loc. cit. 959. 1753.  
*Passiflora nigra* Jacq. Obs. 2:27. pl. 46, fig. 3. 1767.  
*Passiflora glabra* Mill. Gard. Dict. ed. 8. *Passiflora* no. 4. 1768.  
*Passiflora peltata* Cav. Diss. 10:447. pl. 274. 1780.  
*Cieca viridis* Medic. Malvenfam. 97. 1787.  
*Cieca nigra* (Jacq.) Medic. loc. cit. 1787.  
*Passiflora angustifolia* Sw. Prodr. 97. 1788.  
*Passiflora parviflora* Sw. loc. cit. 1788.  
*Passiflora heterophylla* Dryand. in Ait. Hort. Kew. 3:309. 1789, non Lam.  
*Passiflora bederacefolia* Lam. Encycl. 3:38. 1789.  
*Passiflora longifolia* Lam. loc. cit. 40. 1789.  
*Passiflora bederacea* Cav. Diss. 10:448. 1790.  
*Granadilla suberosa* (L.) Gaertn. Fruct. & Sem. 2:480. 1791.  
*Cieca heterophylla* (Dryand.) Moench, Method. Suppl. 101. 1802.  
*Cieca suberosa* (L.) Moench, loc. cit. 102. 1802.  
*Cieca minima* (L.) Moench, loc. cit. 1802.  
*Passiflora litoralis* HBK. Nov. Gen. & Sp. 2:138. 1817.  
*Baldwinia peltata* (Cav.) Raf. Amer. Monthly Mag. 267. 1817.  
*Monactineirma angustifolia* (Sw.) Bory, in Ann. Gén. Sci. Phys. Brux. 2:138. 1819.  
*Monactineirma minima* (L.) Bory, loc. cit. 1819.  
*Monactineirma suberosa* (L.) Bory, loc. cit. 1819.  
*Monactineirma peltata* (Cav.) Bory, loc. cit. 1819.  
*Monactineirma bederacea* (Cav.) Bory, loc. cit. 1819.  
*Passiflora oliviformis* Vell. Fl. Flum. 9: pl. 83. 1827.

- Passiflora globosa* Vell. loc. cit. pl. 85. 1827.  
*Passiflora Kobautiana* Presl, Fl. Bemer. 72. 1836.  
*Passiflora villosa* Macfad. Fl. Jam. 2:151. 1837, non Vell.  
*Meioperis peltata* (Cav.) Raf. Fl. Tellur. 4:103. 1838.  
*Meioperis suberosa* (L.) Raf. loc. cit. 1838.  
*Meioperis minima* (L.) Raf. loc. cit. 1838.  
*Meioperis pallida* (L.) Raf. loc. cit. 1838.  
*Meioperis angustifolia* (Sw.) Raf. loc. cit. 1838.  
*Meioperis hederacea* (Cav.) Raf. loc. cit. 1838.  
*Passiflora Warei* Nutt. in Silliman's Journ. ex Torr. & Gray, Fl. N. Amer. 1:539. 1838.  
*Passiflora limbata* Tenore, Ind. Sem. Hort. Neapol. 12: 1839.  
*Passiflora flexuosa* Gardn. in Lond. Journ. Bot. 1:174. 1842.  
*Passiflora pseudo-suberosa* Fisch. Ind. Sem. Hort. Bot. Petropol. 9:82, ex Walp. Rep. 2:934. 1843.  
*Cieca peltata* (Cav.) M. Roem. Fam. Nat. Syn. 2:141. 1846.  
*Cieca hederacea* (Cav.) M. Roem. loc. cit. 1846.  
*Cieca pallida* (L.) M. Roem. loc. cit. 1846.  
*Cieca angustifolia* (Sw.) M. Roem. loc. cit. 143. 1846.  
*Cieca olivaeformis* (Mill.) M. Roem. loc. cit. 144. 1846.  
*Cieca globosa* (Vell.) M. Roem. loc. cit. 1846.  
*Cieca litoralis* (HBK.) M. Roem. loc. cit. 145. 1846.  
*Cieca pseudo-suberosa* (Fisch.) M. Roem. loc. cit. 146. 1846.  
*Cieca Warei* (Nutt.) M. Roem. loc. cit. 1846.  
*Cieca minima* (L.) M. Roem. loc. cit. 147. 1846.  
*Cieca flexuosa* (Gardn.) M. Roem. loc. cit. 148. 1846.  
*Cieca limbata* (Tenore) M. Roem. loc. cit. 1846.  
*Passiflora lineariloba* Hook. f. in Trans. Linn. Soc. 20:222. 1851.  
*Passiflora tridactylites* Hook. f. loc. cit. 1851.  
*Passiflora puberula* Hook. f. loc. cit. 223. 1851.  
*Passiflora suberosa* var. *divaricata* Griseb. in Bonplandia 6:7. 1858.  
*Passiflora suberosa* var. *minima* (L.) Mast. in Trans. Linn. Soc. 27:630. 1871.  
*Passiflora suberosa* var. *hirsuta* (L.) Mast. loc. cit. 1871.  
*Passiflora suberosa* var. *angustifolia* (Sw.) Mast. loc. cit. 1871.  
*Passiflora suberosa* var. *pallida* (L.) Mast. loc. cit. 1871.  
*Passiflora suberosa* var. *hederacea* (Cav.) Mast. loc. cit. 1871.  
*Passiflora suberosa* var. *lineariloba* (Hook. f.) Mast. in Mart. Fl. Bras. 13<sup>1</sup>:579. 1872.  
*Passiflora suberosa* var. *longiloba* Tr. & Planch. in Ann. Sci. Nat. V. Bot. 17:157. 1873.  
*Passiflora suberosa* var. *longipes* S. Wats. in Proc. Amer. Acad. 25:149. 1890.  
*Passiflora calliaquatica* Krause, in Bot. Centralbl. Beih. 32<sup>2</sup>:340. 1914.

Slender climbers, glabrous to densely puberulent, the base of the stems more or less corky. Leaves petiolate, simple, basifixed, extremely variable, usually definitely 3-lobed, the central lobe longer, rarely almost entire 3-12 cm. long, 2-9 cm. broad, not ocellate or very inconspicuously so; petioles 1-2 cm. long, inconspicuously glandular near the juncture with the leaf blade; stipules inconspicuous and linear. Inflorescences usually paired, each bearing a single small, greenish flower; peduncles filiform, 1-2 cm. long, jointed almost directly beneath the flower; bracts very minute. Flowers about 1-3 cm. in diameter; sepals lanceolate, 0.5-1.5 cm. long, not corniculate; petals absent; filaments of the corona in 2 series, the outer about half as long as the sepals. Fruit globose, deep purple, 0.5-1.5 cm. in diameter.

Peninsular Florida and southern Texas; Mexico to Brazil and Argentina; Bahamas; Antilles; introduced in the Old World tropics. Lowland thickets. *Meloncillo*; *bueno de gallo*.

PANAMÁ: Bella Vista, Standley 25357, Killip 12039; Nuevo San Francisco, Standley 30733. SAN BLAS: Puerto Obaldia, Pittier 4402.

The preposterous bibliography testifies to the ubiquity and variability of *P. suberosa*. It is odd that it has been so infrequently collected in Panama.

14. *PASSIFLORA PULCHELLA* HBK. Nov. Gen. & Sp. 2:134. 1817.

*Passiflora bicornis* Mill. Gard. Dict. ed. 8. *Passiflora* no. 13. 1768.

*Passiflora rotundifolia* Jacq. Obs. 2:26. pl. 46, fig. 1. 1767, non L.

*Passiflora rotundifolia* var. *Jacquini* DC. Prodr. 3:326. 1828.

*Decaloba Jacquini* (DC.) M. Roem. Fam. Nat. Syn. 2:156. 1846.

*Passiflora divaricata* Griseb. in Bonplandia 6:7. 1858.

*Passiflora pulchella* var. *bifidata* Mast. in Engl. Bot. Jahrb. 8:220. 1887.

Rather stout climbers, glabrous throughout. Leaves rather long-petiolate, simple, basifixed, broadly and cuneately 2-lobed, occasionally with a small central lobe, 2-6 cm. long, 3-9 cm. broad, rather inconspicuously glandular-ocellate; petioles 1-3 cm. long, not glandular; stipules linear, 5-10 mm. long. Inflorescences solitary or rarely paired in the axils of the greatly reduced uppermost leaves, bearing solitary involucre blue or lavender flowers, the associated tendrils basal; peduncles 5-8 cm. long, jointed directly beneath the flower; bracts conspicuously involucre, broadly obovate, cuneate at the base, entire, 1.0-1.5 cm. long, pale green occasionally tinged with purple. Flowers about 4-6 cm. in diameter; sepals oblong, about 2 cm. long, not corniculate; petals ovate-lanceolate, about 1.5 cm. long; filaments of the corona in several series, the outer about as long as the petals. Fruit globose, about 1 cm. in diameter.

Southern Mexico to Colombia and Venezuela; cultivated in Hawaii. Thickets near sea level.

CANAL ZONE: Fort Kobe Road, Woodson, Allen & Seibert 1421. PANAMÁ: Bella Vista, Killip 12028, Bro. Heriberto 218; Las Sabanas, Standley 40781.

This is one of the showiest Panamanian passionflowers because the flowers, although not large, are borne in the very characteristic raceme-like clusters at the tips of the stems.

15. *PASSIFLORA MEMBRANACEA* Benth. Pl. Hartw. 83. 1841; Killip, in Field Mus. Publ. Bot. 19:234. 1938.

*Cieca membranacea* (Benth.) M. Roem. Fam. Nat. Syn. 2:140. 1841.

Rather stout climbers, glabrous throughout. Leaves rather shortly petiolate, simple, barely peltate, suborbicular and very indistinctly 3-lobed, the tip and lateral lobes mucronulate, 5-10 cm. long and about as broad; petioles 2-3 cm. long, eglandular; stipules conspicuously foliaceous, deeply cordate-reniform and strongly amplexicaul, 1.5-3.0 cm. broad. Inflorescences solitary at the nodes, bearing a single very strikingly involucre greenish white or cream flower; peduncles 10-15 cm. long, jointed almost immediately beneath the flower; bracts very broadly ovate or suborbicular, very deeply cordate, 4-5 cm. long and broad, pale green strongly suffused with rose. Flowers about 7-8 cm. in diameter; sepals oblong-lanceolate,

about 4 cm. long, not corniculate; petals oblong-elliptic, about as long as the sepals; filaments of the corona in 2 series, the outer about 1 cm. long. Fruits oblong-ovoid, tapered at the base, 4-6 cm. long and 2-3 cm. thick, yellowish green.

Southern Mexico to Panama, in highland forests.

CHIRIQUÍ: Potrero Muleto to summit, Volcán de Chiriquí, Woodson & Schery 389; "New Switzerland", central valley of Río Chiriquí Viejo, Allen 1394.

This is one of the most distinctive and attractive species of the genus by virtue of the elongate peduncles and large petalaceous bracts which almost equal the flowers.

16. *PASSIFLORA ADENOPODA* DC. Prodr. 3:330. 1828; Killip, in Field Mus. Publ. Bot. 19:222. 1938.

*Passiflora acerifolia* Schlecht. & Cham. in Linnaea 5:89. 1830.

*Dysosmia acerifolia* (Schlecht. & Cham.) M. Roem. Fam. Nat. Syn. 2:151. 1846.

*Ceratosepalum micranthum* Oerst. Amer. Centr. pl. 17. 1863.

*Passiflora ceratosepala* Mast. in Trans. Linn. Soc. 27:630. 1871.

*Passiflora aspera* Sessé & Moc. Fl. Mex. 227. 1887.

Coarse climbers, minutely hispidulous to glabrate. Leaves long-petiolate, basifixed, deeply (3-) 5- to 7-lobed, the central and upper lobes stronger, acuminate, deeply cordate, 7-15 cm. long, 8-17 cm. broad, membranaceous, hispidulous to glabrate; petioles 3-8 cm. long, bearing 2 very large prominently stipitate glands near the juncture with the leaf blade; stipules broadly ovate, amplexicaul, denticulate, 1.0-1.5 cm. long and broad, foliaceous, persistent. Inflorescences paired, bearing a single large purple and white flower; peduncle 3-4 cm. long, jointed somewhat below the middle and there bearing 3 lacerate subfoliaceous bracts about 1 cm. long. Flowers about 4-7 cm. in diameter; sepals oblong-lanceolate, 3-4 cm. long, prominently corniculate at the tip; petals narrowly lanceolate, 1.0-1.5 cm. long; filaments of the corona in a single series, about as long as the petals or slightly longer. Fruit globose, 2.0-2.5 cm. in diameter, greenish yellow, densely puberulent.

Southern Mexico to Venezuela and Peru at middle to higher elevations.

CHIRIQUÍ: El Boquete, Seemann 1626.

The Seeman collection was found by Killip at both Kew and the British Museum; it was not examined for the present account.

17. *PASSIFLORA VITIFOLIA* HBK. Nov. Gen. & Sp. 2:138. 1817, Killip, in Field Mus. Publ. Bot. 19:319. 1938.

*Passiflora sanguinea* J. E. Sm. in Rees, Cycl. 26: *Passiflora* no. 45. 1819.

*Passiflora punicea* R. & P. ex DC. Prodr. 3:329. 1828.

*Tacsonia sanguinea* (J. E. Sm.) DC. loc. cit. 334. 1828.

*Macrophora sanguinea* (J. E. Sm.) Raf. Fl. Tellur. 4:103. 1838.

*Passiflora serrulata* var. *pubescens* Griseb. in Bonplandia 6:7. 1858.

*Passiflora servitensis* Karst. in Linnaea 30:163. 1859.

*Tacsonia Buchanani* Lem. Ill. Hort. 14: pl. 519. 1867.

Rather coarse climbers, more or less densely ferruginous-pubescent throughout.

Leaves petiolate, basifixed, rather inconspicuously serrulate, deeply 3-lobed, the central lobe stronger, more or less deeply cordate, 7-15 cm. long, 8-17 cm. broad; petioles 2-6 cm. long, bearing 2 to several rather inconspicuous glands toward the base; stipules subsetaceous, 3-5 mm. long. Inflorescences solitary, bearing a single very showy yellow and scarlet flower; peduncle 4-8 cm. long, jointed almost directly beneath the flower; bracts conspicuous and foliaceous or somewhat petaloid, lanceolate, glandular-serrate to nearly entire, 1.5-2.5 cm. long. Flowers 10-15 cm. in diameter; sepals about 6-10 cm. long, corniculate; petals narrowly lanceolate, nearly as long as the sepals; filaments of the corona in 3 series, the outer 1.5-2.0 cm. long. Fruits broadly ovoid, 3-6 cm. long, greenish yellow, densely puberulent.

Nicaragua to Venezuela and Peru; Cuba and Jamaica; in lowland forests. Known as *guate-guate* and *pasionaria* in Panama.

CANAL ZONE: Las Cruces Trail, *Hunter & Allen 456*; Barro Colorado Island, *Wetmore & Abbe 76*; between Summit and Gamboa, *Greenman & Greenman 5220*; Chagres, *Fendler 118*. CHIRIQUÍ: San Bartolomé, *Woodson & Schery 871*. COCLÉ: mountains beyond La Pintada, *Hunter & Allen 558*; El Valle de Antón, *Allen 1660*. COLÓN: Camp Piña, *Allen 3431*. DARIÉN: Marraganti, *Williams 1150*; Chepigana, *Terry & Terry 1374*; Río Sabana, *Leopold III 126*. PANAMÁ: Tapia River, Juan Díaz region, *Maxon & Harvey 6733, 6678, 6683, Standley 28101*; Tecumen River, *Killip 3313*; Orange River, *Killip 3335*; Pacora, *Bro. Paul 292*.

The dazzling flowers of *P. vitifolia* are frequent and widespread in lowland thickets and open forests throughout the Republic.

18. PASSIFLORA WILLIAMSH Killip, in Journ. Wash. Acad. Sci. 12:262. 1922; in Field Mus. Publ. Bot. 19:355. 1938.

Coarse climbers, softly and densely puberulent throughout. Leaves petiolate, basifixed, deeply 3-lobed to somewhat below the middle, the central lobe stronger and somewhat contracted toward the base, inconspicuously serrulate, 8-15 cm. long, 9-16 cm. broad; petioles 4-6 cm. long, with 2-3 ocellate glands toward the base; stipules filiform, inconspicuous. Inflorescences solitary, bearing a single handsome violet flower; peduncle 1.0-1.5 cm. long, jointed directly beneath the flower; bracts involucrate, united toward the base and completely enveloping the flower before anthesis, 2.5-3.5 cm. long, densely puberulent, pale green. Flowers about 6-7 cm. in diameter; sepals oblong, 3-4 cm. long; petals oblong-spatulate, 2.0-2.5 cm. long; filaments of the corona in several series, the outermost less than half as long as the petals. Fruits unknown.

Known only from Panama, at middle and low elevations.

CANAL ZONE: between Empire and Mandinga, *Piper 5481*; Barro Colorado Island, *Zetek 4352*. COCLÉ: Bismarck, above Penonomé, *Williams 585*. PANAMÁ: Las Sabanas, *Bro. Paul 308*.

This species bears 4 rather conspicuous ocellate glands upon the leaf blade, on each lobe toward the base of the two sinuses; the central lobe thus with two glands, the lateral with one apiece.



19. *PASSIFLORA MENISPERMIFOLIA* HBK. Nov. Gen. & Sp. 2:137. 1817; Killip, in Field Mus. Publ. Bot. 19:457. 1938.

*Passiflora villosa* Dombey, ex Triana & Planch. in Ann. Sci. Nat. ser. 5. 17:154. 1873, in synon.

Rather coarse climbers, more or less densely pilose to glabrate throughout. Leaves petiolate, basifixed, broadly 3-lobed to somewhat above the middle, the central lobe much stronger, usually inconspicuously serrulate toward the cordate base, 7-15 cm. long, 5-13 cm. broad; petioles 2-5 cm. long, with 2 to several pairs of slender stipitate glands; stipules conspicuously foliaceous, ovate-subreniform, deeply amplexicaul, 1.5-3.5 cm. long, glandular-denticulate to subentire. Inflorescences solitary, bearing a single white and purple flower; peduncle 4-6 cm. long, jointed directly below the flower; bracts rather narrowly lanceolate, 1-2 cm. long, foliaceous, with rather few glandular denticulations to entire. Flowers about 6 cm. in diameter; sepals narrowly oblong, 2-3 cm. long, corniculate; petals linear-oblong, about equaling the sepals; filaments of the corona in several series, the outermost about half as long as the petals. Fruits broadly ovoid, 4-6 cm. long.

Nicaragua to Peru and northern Brazil, from near sea level to about 1500 m.

Bocas del Toro: vicinity of Chiriquí Lagoon, Von Wedel 434, 1195, 1406. CANAL ZONE: Madden Dam, Allen 2007; Gatuncillo, Piper 5623; Barro Colorado Island, Woodworth & Vestal 637. CHIRIQUÍ: Boquete, Terry 1281. VERAGUAS: Soná, Woodson, Seibert & Allen 515.

20. *PASSIFLORA SUBPELTATA* Ortega, Nov. Rar. Pl. Hort. Matrit. 6:78. 1789; Killip, in Field Mus. Publ. Bot. 19:436. 1938.

*Passiflora alba* Link & Otto, Icon. Pl. Rar. 65. pl. 33. 1828.

*Passiflora adenophylla* Mast. in Mart. Fl. Bras. 13<sup>1</sup>:568. 1872.

*Passiflora atomaria* Planch. ex Mast. loc. cit. 570. 1872.

Rather slender climbers, glabrous throughout. Leaves shortly petiolate, basifixed, very broadly 3-lobed to about the middle, the 3 lobes subequal, rounded, with 2-3 pairs of inconspicuous serrulate glands in the sinuses, rounded to subcordate at the base, 4-9 cm. long, 5-12 cm. broad; petioles 2-6 cm. long, with 1 pair of inconspicuous glands at about the middle; stipules conspicuously foliaceous, broadly ovate, 1-4 cm. long and about half as broad. Inflorescences solitary, bearing a single purple and white flower; peduncle 2-5 cm. long, jointed directly beneath the flower; bracts conspicuously involucrate, broadly ovate, about 1.0-1.5 cm. long and broad, abruptly acuminate, pale green somewhat tinged with rose. Flowers about 5-7 cm. in diameter; sepals oblong, about 3 cm. long, very conspicuously corniculate; petals narrowly lanceolate, 2.0-2.5 cm. long; filaments of the corona in several series, the outermost about equaling the petals. Fruits subglobose, 3-4 cm. in diameter.

Mexico to Venezuela and Colombia, near sea level to about 2,800 m., in thickets and open forest.

CANAL ZONE: Miraflores, White & White 45; Red Tank, Maxon 6574. PANAMÁ: Juan Díaz, Standley 32051; Taboga Island, Standley 27971.

21. *PASSIFLORA LIGULARIS* Juss. in Ann. Mus. Hist. Nat. 6:113. *pl.* 40. 1805; Killip, in Field Mus. Publ. Bot. 19:344. 1938.

*Passiflora serratifolia* DC. Prodr. 3:328. 1828.

Rather stout climbers, glabrous throughout. Leaves long-petiolate, basifixed, entire, broadly ovate, deeply cordate, abruptly subcaudate-acuminate, 8–17 cm. long, 6–15 cm. broad; petioles 5–15 cm. long, with 3–5 pairs of elongate filiform glands; stipules foliaceous, ovate, 1–3 cm. long. Inflorescences solitary, bearing a single showy pale green, purple- and lavender-tinged flower; peduncles 2–5 cm. long, jointed directly beneath the flower; bracts involucrate and foliaceous, ovate, 2–4 cm. long. Flowers about 7–9 cm. in diameter; sepals oblong, 3–5 cm. long; petals narrowly lanceolate, 3–4 cm. long; filaments of the corona in several series, the outermost about as long as the petals. Fruits broadly ovoid, 6–8 cm. long, purplish yellow.

Southern Mexico to Venezuela and Bolivia, in highland forests between 1,000 and 3,000 m.

CHIRIQUÍ: vicinity of Finca Lérída, Woodson & Schery 238.

22. *PASSIFLORA QUADRANGULARIS* L. Syst. Nat. 1248. 1759; Killip, in Field Mus. Publ. Bot. 19:335. 1938.

*Grenadilla quadrangularis* (L.) Medic. Malvenfam. 97. 1787.

*Passiflora tetragona* M. Roem. Fam. Nat. Syn. 2:165. 1846.

*Passiflora macrocephala* Mast. in Gard. Chron. 1869:1012. 1869.

Coarse climbers with prominently winged stems, glabrous throughout. Leaves petiolate, basifixed, entire, broadly ovate, abruptly and shortly acuminate, rounded at the base to broadly cordate, 10–20 cm. long, 8–15 cm. wide; petioles 2–5 cm. long, with about 3 pairs of ovoid glands; stipules foliaceous, ovate, acuminate, 2–4 cm. long. Inflorescences solitary, bearing a single greenish white flower flushed with rose or purple; peduncles 1.5–3.0 cm. long, jointed directly beneath the flower; bracts delicately foliaceous, broadly ovate, cordate, entire or essentially so, 2–4 cm. long and about as broad. Flowers about 8–12 cm. in diameter; sepals broadly oblong, conspicuously corniculate, 4–5 cm. long; petals ovate-lanceolate, 3–5 cm. long; filaments of the corona in 5 series, about equaling the petals. Fruits broadly oblongoid, up to 3 dm. long, pale yellow somewhat flushed with rose.

Widely cultivated and escaping throughout tropical America; of uncertain origin.

CANAL ZONE: Chagres, Fendler 119. PANAMÁ: Juan Díaz, Standley 32057.

This is one of the most popular edible passionfruits, and is popularly known as *granadilla* throughout its range in Spanish America and *maracujá* in Brazil. It has a rather insipid fruity flavor of indefinite quality, and although capable of being eaten out of hand it usually is made into a conserve or a thin pudding after boiling in milk.



23. *PASSIFLORA OERSTEDII* Mast. in Mart. Fl. Bras. 13<sup>1</sup>:562. 1872; Killip, in Field Mus. Publ. Bot. 19:418. 1938.

*Passiflora populifolia* Triana & Planch. in Ann. Sci. Nat. ser. 5. 17:150. 1873.

*Passiflora Purpusii* Killip, in Journ. Wash. Acad. Sci. 12:261. 1922.

*Passiflora dispar* Killip, loc. cit. 330. 1922.

Rather slender climbers, glabrous throughout. Leaves rather shortly petiolate, basifixed, entire, ovate or oblong-ovate, acuminate, rounded to deeply cordate at the base, 6–13 cm. long, 3–9 cm. broad; petioles 1–3 cm. long, bearing several pairs of small stipitate glands; stipules conspicuously foliaceous, strongly inequilateral, narrowly ovate, caudate-cuspidate, entire, 1–4 cm. long. Inflorescences solitary, bearing a single showy purple or lavender-rose flower; peduncles 3–6 cm. long, jointed directly beneath the flower; bracts delicately foliaceous, ovate, rounded or cordate at the base, 1.0–1.5 cm. long. Flowers about 6–8 cm. in diameter; sepals ovate-lanceolate, 3–4 cm. long, conspicuously corniculate; petals linear-oblancoate, about 1.5 cm. long; filaments of the corona in many series, the



Fig. 2. *Passiflora oerstedii*

outermost equaling the petals or somewhat longer. Fruits broadly ovoid, 4–6 cm. long.

Southern Mexico to Colombia and Venezuela, from near sea level to about 1500 m., in open forest.

BOCAS DEL TORO: Water Valley, Von Wedel 1756. COCLÉ: La Mesa, north of El Valle de Antón, Allen 2399. CHIRIQUÍ: Bajo Mona and Quebrada Chiquero, Woodson & Schery 591; Volcán de Chiriquí, Terry 1303.

24. *PASSIFLORA AMBIGUA* Hemsl. in Curt. Bot. Mag. pl. 7822. 1902; Killip, in Field Mus. Publ. Bot. 19:363. 1938.

Rather coarse climbers, glabrous throughout or essentially so. Leaves petiolate, basifixed, entire, ovate to oblong-elliptic, acuminate, obtuse or rounded at the base, 10–20 cm. long, 5–9 cm. broad, rather thickly coriaceous; petioles 2–3 cm. long, bearing 2 thick ocellate glands toward the base; stipules filiform, relatively inconspicuous. Inflorescences solitary, bearing a single showy maroon, rose, or purple flower; peduncles 5–7 cm. long, jointed directly beneath the flower; bracts free, ovate, 3–6 cm. long, delicately subfoliaceous or somewhat petalaceous. Flowers 8–12 cm. in diameter; sepals narrowly oblong, 4–6 cm. long, rather inconspicuously corniculate; petals narrowly lanceolate, 3–4 cm. long; filaments of the corona in several series, the outermost about half as long as the petals. Fruits broadly ovoid, 10–12 cm. long, greenish yellow.

Southern Mexico to Panama, from near sea level to about 1000 m., in thickets and open forest.

BOCAS DEL TORO: Fish Creek Mountains, *Von Wedel 2324*; Columbus Island, *Von Wedel 80*. CANAL ZONE: Gatún, *Sutton Hayes 430*; Barro Colorado Island, *Bangham 466*. COCLÉ: north rim of El Valle de Antón, *Allen 1686*.

25. *PASSIFLORA NITIDA* HBK. Nov. Gen. & Sp. 2:130. 1817; Killip, in Field Mus. Publ. Bot. 19:374. 1938.

*Passiflora nymphaeoides* Karst. in Linnaea 30:165. 1859.

Rather coarse climbers, glabrous throughout. Leaves rather shortly petiolate, basifixed, rather distantly serrate or serrulate, at least toward the base, broadly elliptic to lanceolate, abruptly acuminate, rounded at the base, 9–18 cm. long, 6–10 cm. broad, subcoriaceous; petioles 1.0–1.5 cm. long, with 2 large ovoid glands somewhat above the middle; stipules inconspicuous and filiform. Inflorescences solitary, bearing a single showy white and purple flower; peduncles 3–6 cm. long, jointed directly beneath the flower; bracts free, ovate, entire, 3–4 cm. long, foliaceous or somewhat petalaceous. Flowers 8–9 cm. in diameter; sepals oblong-elliptic, 4.0–4.5 cm. long, inconspicuously corniculate; petals about as long as the sepals; filaments of the corona in several series, the outermost about half as long as the petals. Fruits obovoid, 4–6 cm. long.

Panama to northern Brazil and adjacent Peru, in lowland thickets and open forests.

CANAL ZONE: Barro Colorado Island, *Shattuck 675*; Summit, *Lindsay 230*.

26. *PASSIFLORA SEEMANNII* Griseb. in Bonplandia 6:7. 1858; Killip, in Field Mus. Publ. Bot. 19:347. 1938.

*Passiflora incana* Seemann, ex Mast. in Journ. Linn. Soc. 20:40. 1883, non Kerr, in synon. *Passiflora orbifolia* Planch. & Linden, in Ann. Sci. Nat. ser. 5. 17:150. 1873.

Rather stout climbers, glabrous throughout. Leaves petiolate, basifixed, entire, broadly cordate-ovate, abruptly and shortly apiculate-acuminate, 5–10 cm. long, 5–7 cm. broad; petioles 3–7 cm. long, with 2 rather inconspicuous sessile glands directly below the leaf blade; stipules linear, about 1 cm. long. Inflorescences

solitary, bearing a single handsome white or cream flower strongly suffused with purple or violet; peduncles 6–10 cm. long, jointed directly below the flower; bracts more or less petalaceous, united at the base and completely enveloping the flower before anthesis, 3–5 cm. long. Flowers about 8–10 cm. in diameter; sepals narrowly ovate, 4–5 cm. long, rather inconspicuously corniculate; petals oblong-lanceolate, 3–4 cm. long; filaments of the corona in 2 series, the outer about 1 cm. long. Fruits ovoid, 3–5 cm. long and broad.

Southern Mexico to Colombia, at near sea level to about 1,500 m.

BOCAS DEL TORO: Lincoln Creek, Río Changuinola, *Dunlap* 422; vicinity of Chiriquí Lagoon, *Von Wedel* 1260, 1366; Water Valley, *Von Wedel* 1679. CANAL ZONE: Bohío, *Maxon* 4765; Gamboa, *Pittier* 2515, *Allen* 3930; between Summit and Gamboa, *Greenman* & *Greenman* 5221; Gatún, *Bro. Heriberto* 53; between Mt. Hope and Sta. Rita Trail, *Cowell* 59; Las Cascadas, near Summit, *Standley* 29566; East Paraiso, *Standley* 29838; Quebrada Culebra, *Dodge* & *Allen* 17048; Las Cruces Trail, *Hunter* s. n.; Chagres, *Fendler* 120; Miraflores, *White* & *White* 42. COLÓN: between France Field and Catival, *Standley* 30286. DARIÉN: Tucute, Chepigana District, *Terry* & *Terry* 1393. PANAMÁ: hills above Campana, *Allen* 1694; Tapia River, *Maxon* & *Harvey* 6730, *Standley* 28179, *Killip* 3297; Juan Díaz, *Standley* 30634.

This handsome species has been introduced into cultivation in Mexico, Nicaragua, and Hawaii, according to Killip. According to Killip also, the leaves occasionally are lobed, but those of all the specimens cited above are entire.

27. *PASSIFLORA FOETIDA* L. Sp. Pl. 959. 1753; Killip, in Field Mus. Publ. Bot. 19:481. 1938.

- Passiflora vesicaria* L. Amoen. Acad. 5:382. 1760.  
*Passiflora bibiscifolia* Lam. Encycl. 3:39. 1789.  
*Passiflora ciliata* Dryand. in Ait. Hort. Kew. 3:310. 1789.  
*Granadilla foetida* (L.) Gaertn. f. Fruct. & Sem. 1:289. 1790.  
*Passiflora gossypifolia* Desv. in Hamilt. Prodr. Fl. W. I. 48. 1825.  
*Tripsilina foetida* (L.) Raf. Fl. Tellur. 4:103. 1838 (as *foetida*).  
*Passiflora nigelliflora* Hook. Bot. Mag. pl. 3635. 1839.  
*Passiflora hastata* Bertol. Fl. Guat. 427. 1840.  
*Dysosmia foetida* (L.) M. Roem. Fam. Nat. Syn. 2:149. 1846.  
*Dysosmia gossypifolia* (Desv.) M. Roem. loc. cit. 1846.  
*Dysosmia hastata* (Bertol.) M. Roem. loc. cit. 1846.  
*Dysosmia bibiscifolia* (Lam.) M. Roem. loc. cit. 1846.  
*Dysosmia ciliata* (Dryand.) M. Roem. loc. cit. 1846.  
*Dysosmia fluminensis* M. Roem. loc. cit. 150. 1846.  
*Dysosmia nigelliflora* (Hook.) M. Roem. loc. cit. 151. 1846.  
*Passiflora Baraquiniana* Lem. in Illustr. Hort. 8: pl. 276. 1861.  
*Passiflora Liebmanni* Mast. in Mart. Fl. Bras. 13<sup>1</sup>:547. 1872.  
*Passiflora hispida* DC. ex Triana & Planch. in Ann. Sci. Nat. ser. 5. 17:172. 1873.  
*Passiflora Moritziana* Planch. loc. cit. 175. 1873.  
*Passiflora muralis* Barb. Rodr. in Contr. Jard. Bot. Rio Jan. 1:29. 1891.  
*Passiflora Balansae* Chod. in Bull. Herb. Boiss. ser. 2. 2:744. 1902.  
*Passiflora pseudociliata* Britton, in Bull. Torrey Bot. Club 44:19. 1917.  
 (Also very numerous varietal and formal designations).

Rather slender climbers, commonly more or less yellow-pubescent throughout, less frequently glabrate or glabrous. Leaves petiolate, basifixed, extremely variable, in Panama chiefly broadly and acutely 3-lobed to about the middle, the central lobe

far stronger, usually about 4–12 cm. long and wide; petioles usually about 2–6 cm. long, usually beset with mixed glandular and eglandular hairs; stipules subsetaceous, inconspicuous. Inflorescences solitary, bearing a single greenish white or yellow, more or less purple-tinged flower; peduncles 3–7 cm. long, jointed directly beneath the flower; bracts foliaceous, complexly 2- or 3-pinnatifid, each filiform division gland-tipped, usually 2–4 cm. long. Flowers about 4–6 cm. in diameter; sepals oblong-lanceolate, about 2–3 cm. long, shortly corniculate; petals oblong-ob lanceolate, slightly shorter than the sepals; filaments of the corona in several series, the outermost about 1 cm. long. Fruits subglobose, yellow or orange, about 2–3 cm. in diameter.

Common throughout tropical America in lowland thickets and open forest, becoming a weed.

BOCAS DEL TORO: Old Bank Island, *Von Wedel* 2142; Water Valley, *Von Wedel* 1718, 1831; vicinity of Chiriquí Lagoon, *Von Wedel* 1562. CANAL ZONE: Las Cruces Trail, *Hunter & Allen* 724; near mouth of Río Chagres, *Allen* 899; Chagres, *Fendler* 117; Ft. San Lorenzo, *Maxon & Valentine* 7013; Matías Hernández, *Pittier* 6954; Gatún Station, *Sutton Hayes* 597; Ahorca Lagarto to Culebra, *Cowell* 393; valley of Masambí, *Pittier* 2678; Río Grande, near Culebra, *Pittier* 2089. CHIRIQUÍ: llanos west of Gualaca, *Allen* 5048. COLÓN: Porto Bello, *Pittier* 2474. DARIÉN: trail between Pinogana and Yavisa, *Allen* 292. PANAMÁ: Taboga Island, *Miller* 2042, *Pittier* 3569; Tapia River, *Maxon* 6719.

*Passiflora foetida* must be frequent at low elevations in every province of Panama. The species, although unmistakable, is extremely variable in small details, and Killip recognized no less than 42 named varieties. All of the specimens enumerated above he referred to var. *isthmia* Killip.

## CARICACEAE

Soft-wooded laticiferous shrubs and small trees, usually dioecious or monoecious and with disproportionately thick, simple or infrequently branching trunks ornamented with large leaf scars. Leaves spiral, usually quite large and long-petiolate, exstipulate, the blade palmately compound or simple and variously lobed, rarely entire. Inflorescence axillary at the uppermost nodes, the staminate an extensive and highly compound thyrse, the pistillate much less compounded and with fewer and larger flowers, the fruits developed at the base of the young growth and appearing cauliflorous. Flowers dichlamydeous, 5-merous, regular, hypogynous, sympetalous but usually imperfectly so in the pistillate; calyx lobes 5, imbricate or nearly open in aestivation, usually inconspicuous; corolla salverform or infundibuliform and with a well-developed tube in the staminate, more or less campanulate and rather imperfectly sympetalous in the pistillate, the limb 5-lobed with contorted aestivation; stamens 10 in 2 whorls inserted near the orifice of the corolla tube, the antepetalous usually with somewhat shorter filaments than the antesealous, the filaments occasionally more or less petaloid or with petaloid appendages, reduced to staminodia or absent in pistillate flowers; pistil superior, 3- to 5-carpellate, usually 1-celled and with parietal placentation, rarely 3- to 5-celled

and with axile placentation, the ovules numerous, anatropous, the stigmas 3-5, sessile or essentially so, usually dichotomous, rarely subcapitate, reduced to an acicular pistillode or absent in staminate flowers. Fruit a very large to rather small succulent 1- to 5-celled berry, the numerous seeds with pulpy testas and funicles.

The Caricaceae are a small family of four genera, all tropical American except the bitypic *Cylicomorpha* of Africa. The plants are of strikingly antediluvian aspect with their stout, usually simple trunks heavily ornamented with large spiral leaf scars and their terminal crowns of fern-like leaves. The latex tubes, which traverse all parts of the plant, are associated with various proteolytic enzymes, particularly papain.

- |   |              |
|---|--------------|
| a. Leaves palmately compound; petals antesealous; ovary 5-celled.....   | 1. JACARATIA |
| aa. Leaves palmately lobed; petals alternisepalous; ovary 1-celled..... | 2. CARICA    |

### 1. JACARATIA Marcgr. ex Endl.

JACARATIA Marcgr. ex Endl. Gen. 933. 1839 (as *Jaracatia*).

*Pileus* Ramirez, in An. Inst. Med. Nac. Mex. 5:29. 1901.

Dioecious shrubs and trees, branching rather frequently for the family, the trunk becoming very thick. Leaves palmately compound, with 3-12 petiolulate, entire or undulate leaflets. Inflorescences in the axils of the uppermost leaves, thyrsiflorous, the staminate extensive and many flowered, the pistillate reduced and with few larger flowers. Calyx 5-lobed, inconspicuous. Corolla salverform or narrowly infundibuliform, the limb 5-lobed, antesealous. Stamens 10, the filaments and connectives more or less conspicuously petaloid. Ovary 5-celled, containing numerous ovules on axile placentas. Berry usually rather elongate, 5-celled. Probably about a dozen species extending from Mexico to Paraguay.

- |   |                     |
|---|---------------------|
| a. Stems unarmed; leaflets 3-5, green beneath.....  | 1. J. DOLICHAULA    |
| aa. Stems armed with conspicuous spines; leaflets 5-9, very pale and glaucous beneath. .... | 2. J. COSTARICENSIS |

1. JACARATIA DOLICHAULA (Donn. Sm.) Woodson, in Ann. Missouri Bot. Gard. 37:404. 1950.

*Carica dolichaula* Donn. Sm. in Bot. Gaz. 23:247. 1897.

Trees up to 12 m. tall, the trunk usually thickened toward the base, the branches glabrous and unarmed. Leaves palmately compound with 3-5 petiolulate broadly elliptic or obovate, caudate-acuminate leaflets 6-15 cm. long, 2-6 cm. broad, green beneath, the petiolules about 1 cm. long; petioles slender, up to about 15 cm. long. Inflorescences much shorter than the subtending petioles, the staminate up to about 30-flowered, the pistillate usually 1- to 3-flowered. Staminate flowers: calyx lobes broadly ovate, about 1 mm. long; corolla slender and salverform, the tube 3-5 cm. long, about 3 mm. in diameter, scarcely dilating toward the orifice, pale green or greenish white, the lobes oblong-spatulate, obtuse or acute, 1.0-1.25 cm. long, slightly spreading, white occasionally tinged with pink toward the tip; stamens inserted at the orifice of the corolla tube, exerted, the antepetalous

Fig. 3. *Jacaratha dolichaula*

with very short filaments, the alternating whorl sessile, the anthers narrowly oblong, about 5 mm. long, the connective petaloid and somewhat longer than the anther; pistillode narrowly acicular, about 1 cm. long. Pistillate flowers: calyx lobes broadly ovate, about 1-2 mm. long; corolla shortly salverform, the tube about 1.5 cm. long, about 5 mm. in diameter at the base, contracting toward the



middle, then dilated to about 7 mm. at the orifice, white, the lobes narrowly oblong, about 1.5 cm. long, slightly spreading, white; staminodia absent or inserted at the orifice of the corolla tube, sessile, essentially like the stamens of the staminate flower but the anthers somewhat smaller and the petaloid connectives somewhat larger; ovary oblong-ovoid, about 5 mm. long, 5-celled, the stigma with 5 ovate essentially entire lobes. Berries ovoid-fusiform, about 10 cm. long and 5 cm. broad, persistently 5-celled, containing numerous compressed ovoid seeds 7-8 mm. long; fruiting peduncle about 3.5 cm. long.

Costa Rica and Panama, in forests, 200-1000 m. elev. Popular names recorded by Standley in Costa Rica are *papaya*, *papaya de monte*, *papayillo*, *palo de barril*, who explains the last as follows: "The palo de barril, which I believe referable to this species, is common in Guanacaste, where it is a large tree with broad crown and a very thick trunk. This is so soft or spongy that with a few slashes of a machete it is possible to fell a large tree. If a large trunk is thus cut, and left for some weeks to dry, it is possible to separate a cylinder of bark. Sections of this are used in place of barrels, for storing maize and other articles." (Fl. Costa Rica 2:724. 1937).

BOCAS DEL TORO: Fish Creek, vicinity of Chiriquí Lagoon, *Von Wedel 1084, 2207*.  
VERAGUAS: forested slopes of Cerro Tuté, vicinity of Santa Fé, *Allen 4392*.

2. *JACARATIA COSTARICENSIS* I. M. Johnston, in Contr. Gray Herb. 70:79. 1924.

Trees up to 20 m. or more, the branches armed with numerous short stout spines, glabrous. Leaves palmately compound with 5-9 very shortly petiolulate oblanceolate shortly acuminate entire leaflets 7-12 cm. long and 2-3 cm. broad, dark green above, very heavily glaucous beneath, the petiolules about 1.0-1.5 cm. long; petioles slender, 10-20 cm. long. Inflorescences shorter than the subtending petioles, the staminate racemose-paniculate, many-flowered, the pistillate erect, long-pedunculate, 1-flowered. Staminate flowers about 17 mm. long, very glaucous without, narrowly clavate in bud, the lobes about 7 mm. long, linear, obtuse, the tube narrowly cylindric, about 1.2 mm. broad, sparsely villous within; stamens strigose, strongly unequal, the filaments conspicuously connate, the anthers similar, without a ligulate connective, with a small erect spiniform process. Berry pyriform, up to about 7 cm. long and 3 cm. broad, orange, the fruiting peduncle pendulous, up to about 10 cm. long.

Costa Rica and Panama, in forests near sea level to about 700 m. elev. Tonduz reports the vernacular name in Costa Rica as *papayillo de venado*.

COLÓN: vicinity of Camp Piña, alt. 25 m., *Allen 3679*.

The description of the flowers is taken from Johnston; our specimen is fruiting. *Jacaratia costaricensis* is closely related to *J. spinosa* (Aubl.) DC., as noted by Johnston. Both species are very glaucous, particularly the lower surface of the leaves, and the chief distinguishing character obvious from our meagre herbarium representation appears in the length of the fruiting peduncles, which are only up to about 2 cm. and suberect in *J. spinosa*.

## 2. CARICA L.

CARICA L. Spec. Pl. 1036. 1753.

*Papaya* [Tourn.] Adans. Fam. Pl. 2:357. 1763.

*Vasconcellea* St. Hil. 2e. Mem. Resed. 13. 1837.

Dioecious or monoecious trees and shrubs, the thick succulent trunk usually unbranched. Leaves simple and palmately lobed in the Panamanian species, long-petiolate. Inflorescences in the axils of the uppermost leaves, thyrsiflorous, the staminate extensive and many-flowered, the pistillate reduced and with fewer larger flowers. Calyx 5-lobed, inconspicuous. Corolla salverform in the staminate flowers, campanulate in the pistillate, the limb 5-lobed, alternisepalous. Stamens 10, the connective occasionally produced at the tip. Ovary usually 1-celled, usually septate at the base, containing numerous ovules on parietal placentas. Berry broadly ovoid-pyriform, 1-celled.

Although the papaya is one of the most common and favorite fruits of the tropics, appearing to the outlander like some celestial melon, the genus is in a state of botanical confusion with at least 50 poorly defined "species" ranging from Mexico to Argentina and in the Antilles. It has been introduced into the Eastern Hemisphere since long ago and frequently escapes.

- |   |                      |
|---|----------------------|
| a. Leaves with 7 palmate primary veins, usually with 7 deeply and irregularly pinnatifid segments; pistil of pistillate flowers with 5 dichotomous or trichotomous stigma lobes; staminate flowers with broadly deltoid calyx lobes about 1 mm. long and yellow or white corollas 3-4 cm. long. | 1. C. PAPAYA         |
| aa. Leaves with 5 palmate primary veins, with 5 shallow segments each with 1-2 broad lateral lobes; pistil of pistillate flowers with 5 linear undivided stigma lobes (presumptive for <i>C. chiriquensis</i> ).  |                      |
| b. Leaves and inflorescences glabrous or essentially so, the middle segment of the leaves 3-lobed, the 4 lateral segments unlobed; (staminate flowers with white corollas about 4 cm. long and ovate calyx lobes about 1 mm. long?)   | 2. C. CUCURBITIFOLIA |
| bb. Leaves and inflorescences rather sparsely villous, the middle segment of the leaves 3-lobed, the 4 lateral segments with a single broadly acute lobe; staminate flowers with pale green corollas 1.5-2.5 cm. long and lanceolate calyx lobes about 3 mm. long.                              | 3. C. CHIRIQUENSIS   |

1. CARICA PAPAYA L. Sp. Pl. ed. 1. 1466. 1753.

*Papaya sativa* Tussac, Fl. Ant. 3:45. pl. 10-11. 1824.

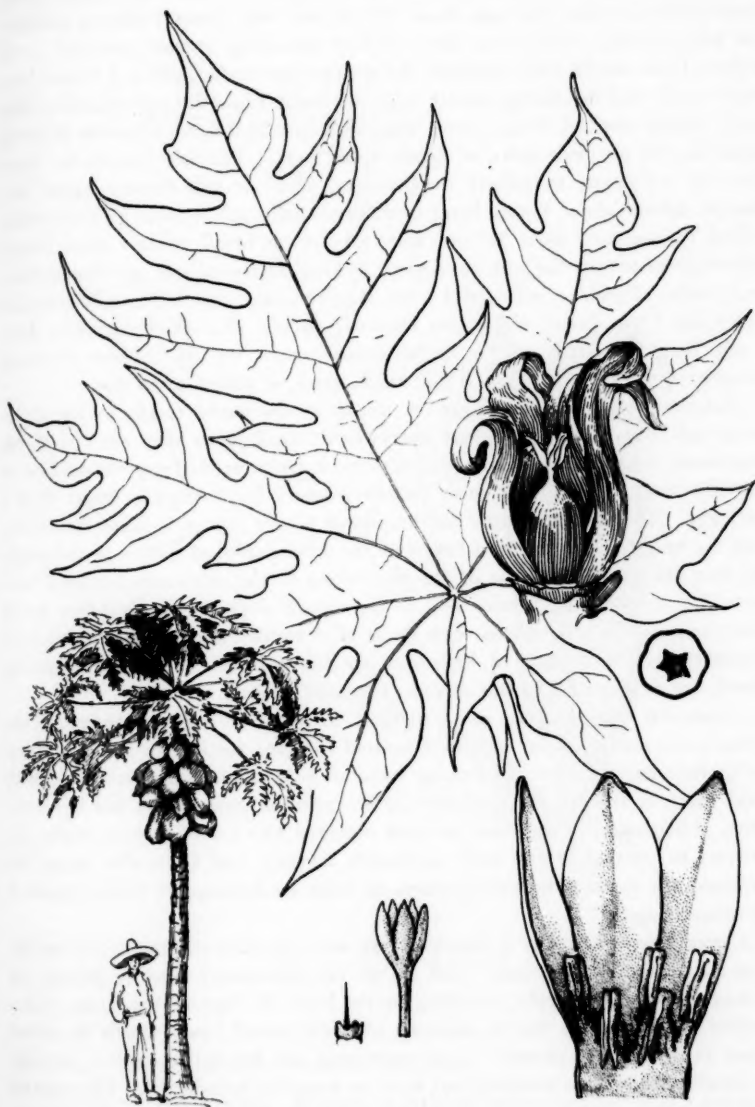
*Carica Mamaja* Vell. Fl. Flum. 10: pl. 131. 1827.

*Papaya vulgaris* A. DC. in DC. Prodr. 15<sup>1</sup>:414. 1864.

*Carica berrapbrodita* Blanco, Fl. Filip. 3:212. 1879.

Dioecious or occasionally polygamous or monoecious trees 2-8 m. tall with characteristic stout succulent and unbranched trunks, usually glabrous in all parts or essentially so. Leaves in a dense terminal crown, long-petiolate; blade simple but palmately divided into usually 7 more or less irregularly and broadly pinnatifid segments, variable in size but frequently up to 4-5 dm. in diameter; petiole usually up to 5-7 dm. long. Staminate inflorescences repeatedly compound, many-flowered, somewhat shorter than the subtending petioles, spreading or pendulous, the pistillate far shorter than the subtending petioles, usually only 1- to 3-flowered. Staminate



Fig. 4. *Carica papaya*

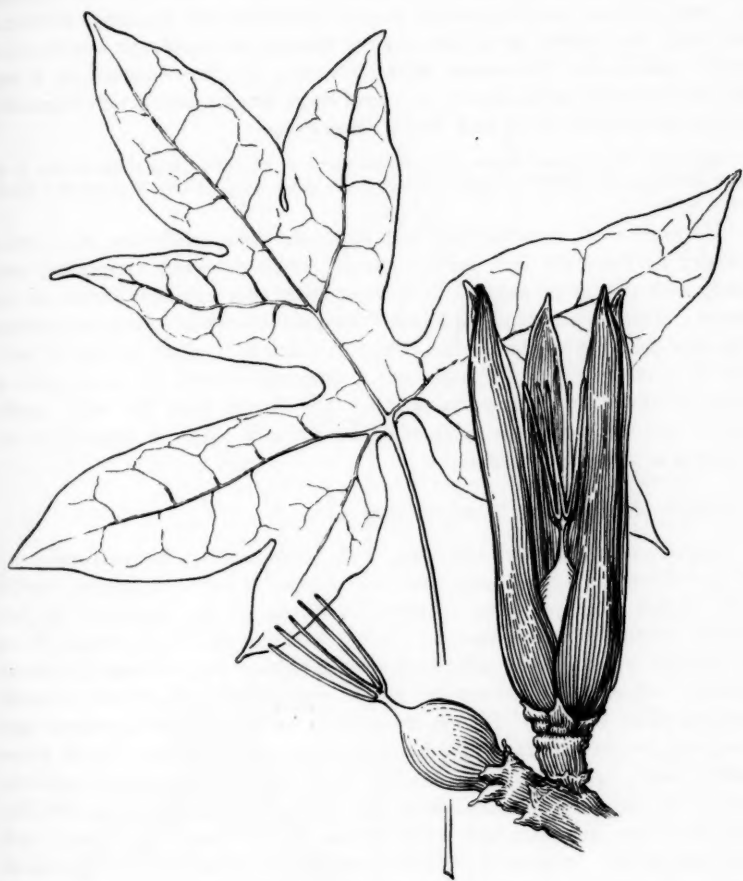
flowers: calyx lobes very broadly deltoid, obtuse, about 1 mm. long; corolla salverform white or yellow, the tube about 1.5–2.0 cm. long, about 2 mm. in diameter, the lobes oblong, 1.0–1.5 cm. long, slightly spreading; stamens inserted at the orifice of the corolla tube, exserted, the antepetalous anthers about 2.5 mm. long, nearly sessile and descending basally into the corolla tube, the antesepalous anthers erect, wholly exserted, about 2 mm. long, with apically 2-lobed filaments of nearly equal length; pistillode acicular, about 1 cm. long. Pistillate flowers far larger than the staminate, irregularly campanulate, white or pale cream: calyx lobes broadly deltoid, about 1 mm. long; corolla essentially polypetalous or very weakly united, the segments about 5–7 cm. long, 1.5–2.0 cm. broad, broadly acute, irregularly reflexed toward the tips; staminodia lacking, rarely minute and hypogynous; ovary ovoid-ellipsoid, usually about 3 cm. long (including the indefinitely attenuate style) and 2 cm. broad, the stigma essentially sessile, of 5 thick segments about 1 cm. long fimbriately di- or trichotomous toward the tip. Berry extremely variable, up to 3 dm. long and 2 dm. thick, green or yellow when ripe.

*Papayos* are grown throughout the tropics of the world, chiefly at low elevations, and tend to become escapes everywhere. In Panama they are one of the commonest weed trees, and the quality of their fruits varies from the sublime to the ridiculous. Some of the most inferior produce fruits scarcely larger than a hen's egg. The vast man-made distribution of *Carica papaya* is quite at variance with the very restricted natural ranges of the other published species of the genus, and even the approximate site of the progenitors of the cultivated papaya is now impossible to ascertain: it may well be the eastern slopes of the Peruvian Andes where most of the wild species with similar leaf forms occur today. Under such circumstances the citation of herbarium specimens is apt to become somewhat absurd, but is appended to this account for good measure.

Associated with the latex of all parts of the plant are various proteolytic enzymes, particularly papain, which are isolated and used for various pharmaceutical and gastronomic purposes. In Panama leaves of *papayo* sometimes are cooked with tough meat, or the raw meat softened by wrapping in green leaves and left overnight. Hernando Cortés is said to have observed this use of *papayo* during his conquest of Mexico in the early eighteenth century, and from this source has developed the recently booming process of meat tenderizing, in which papain is a prominent agent.

*Carica papaya* normally is dioecious. In some districts of Panama the inhabitants adhere to a "superstition" that barren (i.e. staminate) trees of *papayo* can be made fruitful by deeply inscribing in the bark the Sign of the Cross with a machete. I have been shown examples of such incised trees, which do indeed appear to become polygamous. Local experience also has it that such a tree does not become fruitful permanently but must be wounded periodically. The response would appear to have scientific foundation upon the basis of traumatic reversion.

BOCAS DEL TORO: Careening Cay, Von Wedel 573. CANAL ZONE: Barro Colorado Island, Shattuck 165; low ground, outskirts of Ancón, Greenman & Greenman 5073; Cocoli Island, vicinity of Miraflores Lake, P. White 290.

Fig. 5. *Carica cucurbitifolia*2. *CARICA cucurbitifolia* Woodson, spec. nov.

Arbores ca. 3-6 m. altae. Folia longe petiolata glabra lamina simplici palmatim 5-divisa basi 5-venosa segmento centrali maximo profunde lateque 3-partito usque 15 cm. longo et lato vel ultra (speciminis nostri juvenalis) segmentis 2 mediis ca. 12 cm. longis 6 cm. latis atque 2 basalibus 6 cm. longis 3 cm. latis omnino integris.

Inflorescentia mascula jam ignota feminea valde contracta usque ca. 7-flora pedunculo ca. 2 cm. longo. Florum femineorum calycis laciniae minute trigonales ca. 2 mm. longae. Corolla ejusdem generis tubulosa ca. 2.5 cm. longa tubo ca. 3 mm. diam. basi videtur lacteo lobis anguste oblongis ca. aequilongis erectis apicem versus roseo-tinctis. Staminodia nulla. Ovarium in flore ovoideum ca. 6 mm. longum glabrum in stylo angusto ca. 3 mm. longo abrupte contractum stigmatibus 5 linearibus integris 10–12 mm. longis. Bacca ignota.

COCLÉ: in heavy forest below grass, region north of El Valle, grass ridge known as the Loma del Tigre, alt. 2800 ft., April 8, 1947, P. H. Allen 4478 (Herb. Missouri Bot. Gard., HOLOTYPE).

The ovary of *C. cucurbitifolia*, with its slender style, recalls that of *C. stylosa* Heilborn of Peru, the leaf segmentation of which, however, corresponds more closely with that of *C. papaya*. It is unfortunate that staminate flowers are not known. In the herbarium of the Missouri Botanical Garden is a staminate specimen of *papaya* collected by Skutch (no. 4797) in Costa Rica which appears to be related to *C. cucurbitifolia*, although with a differently divided leaf more similar in outline to that of the succeeding species. The Skutch plant has white corollas about 4 cm. long and ovate calyx lobes about 1 mm. long. It definitely is not *C. papaya* as presently determined.

### 3. *CARICA chiriquensis* Woodson, spec. nov.

Arbores usque 7 m. altae vel ultra. Folia longe petiolata lamina simplici palmatim 5-divisa basi 5-venosa segmento centrali maximo profunde lateque 3-partito usque 35 cm. longo nisi ultra segmentis mediis ca. 25 cm. longis 12 cm. latis margine inferiore late auriculato segmentis 2 basalibus ca. 20 cm. longis 10 cm. latis margine inferiore acute auriculato membranacea pagina inferiore sparsiuscule villosula. Inflorescentia feminea jam ignota mascula effuse thyrsiflora pedunculis gracilibus dense villosulis. Florum masculorum calycis laciniae lanceolatae apice acuminatae laxae reflexae ca. 3 mm. longae margine minute ciliato. Corolla florum ejusdem generis pallide viridis magnitudine valde variabilis tubo anguste cylindrico extus sparse pilosulo ca. 1.5 mm. diam. tum 5 mm. tum 15 mm. longo lobis linearibus ca. 1 mm. latis extus apice versus densius pilosulis tum 7 mm. tum 12 mm. longis laxae patulis. Stamina 10 ad ostium corollae tubi posita exserta antepetalorum antheris cum appendice apicali ca. 1.5 mm. longis filamento ligulari integro ca. 0.5 mm. longo alternorum vix 1 mm. longis filamento simili sed 2 mm. longo. Pistilodidium anguste aciculiforme ca. 8 mm. longum. Bacca ut dicitur ca. 15 cm. longa 13 cm. lata 5-angulata.

CHIRIQUÍ: Quebrada Velo, vic. Finca Lérída, alt. 5000 ft., July 24, 1947, P. H. Allen 4675 (Herb. Missouri Bot. Gard., HOLOTYPE).

Perhaps it is tempting fate to describe two new dioecious species, apparently closely related, from such neighboring areas as Chiriquí and Coclé when only the complimentary sexual forms are known. The forms differ as indicated in the key and the descriptions, however, and *C. cucurbitifolia* is glabrous while *C. chiriquensis*

is villous. The leaf form of *chiriquensis* is quite similar to that of the Skutch plant from Costa Rica which was discussed under *cucurbitifolia*, but the staminate flowers are strikingly dissimilar.



Fig. 6. *Carica chiriquensis*

## LOASACEAE

Mostly perennial or annual herbs, sometimes quite massive, erect or clambering, infrequently twining or climbing, characteristically strongly hispid and with stinging hairs and glochids. Leaves opposite or alternate, variously incised and occasionally palmatifid or pinnatifid; stipules lacking or vestigial. Inflorescence terminal or extra-axillary, basically cymose but frequently monopodial and occasionally reduced to a solitary flower. Flowers dichlamydeous, hermaphrodite, epigynous, 5- or rarely 4-, 6-, or 7-merous; sepals foliaceous, imbricate or open in aestivation; petals free or united at the base, imbricated or contorted; stamens rarely 5-10 or fewer, usually very numerous, the filaments more or less united to the base of the corolla, all fertile or partly staminodial and more or less petaloid; ovary inferior, usually 3- to 5-carpellate and 1-celled with numerous ovules on parietal placentas, rarely 1-carpellate with a single pendulous ovule (*Gronovia*), the style simple with a capitate or obscurely divided stigma. Fruit a variously dehiscent capsule.

Except for the peculiar monotypic genus *Kissenia* of Africa and southern Arabia, the Loasaceae are an American family most frequent in arid or semi-arid regions with greatest diversification in Mexico and the southwestern United States and in Chile. Those who have encountered them in the field remember them henceforth chiefly because of their painfully stinging hairs which seem to have been specially contrived to protect the elaborate and frequently very showy flowers.

- |  |               |
|--|---------------|
| a. Ovary 3- to 5-carpellate, with numerous ovules or parietal placentas; stamens 10 to many, frequently staminodial in part; erect or sprawling herbs; leaves variously incised or lobed, sometimes pinnatifid or pinnate. |               |
| b. Stamens all fertile or the outer becoming centrifugally petaloid.....   | 1. MENTZELIA  |
| bb. Fertile stamens antesepalous, staminodia antesepalous.   |               |
| c. Flowers 4-merous; staminodia free or united only at the base.....   | 2. KLAPROTHIA |
| cc. Flowers 5-(rarely 6- to 7-)merous; staminodia strongly united into a more or less saccate petaloid scale.....  | 3. LOASA      |
| aa. Ovary 1-carpellate, with a single apical pendulous ovule; stamens 5, all fertile; slender twiners; leaves very deeply and palmately divided.....   | 4. GRONOVIA   |

The genus *Sclerobrix* extends from southern Mexico to Bolivia and is to be expected in Panama. It resembles *Klaprothia* strongly, but may be recognized readily by its spirally contorted fruits.

## 1. MENTZELIA L.

MENTZELIA L. Syst. ed. 10. 1076. 1759; Urb. in Nova Acta Abh. K. Leop.-Carol. Deutsch. Akad. Naturf. 76:22. 1900.

*Bartonia* Pursh, in Sims, Bot. Mag. sub t. 1487. 1812, non Muhl.  
*Acrolasia* Presl, Rel. Haenk. 2:39. 1835.  
*Torreyia* Eaton, Man. Bot. ed. 7. 560. 1836, nec Arn. nec alior.  
*Creolobus* Lilj. Fl. Oefver Sver. Odl. Vext. 67. 1839.  
*Trachyphytum* Nutt. ex Torr. & Gray, Fl. N. Am. 1:533. 1840.  
*Chrysostoma* Lilj. in Linnaea 15:263. 1841.  
*Hesperaster* Cockerell, in Torreyia 1:142. 1901.

Fig. 7. *Mentzelia aspera*

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Herbaceous annuals or perennials, rarely small shrubs or trees, the stems and foliage scabrous and hispid, but without stinging hairs. Leaves alternate or opposite, variously incised or lobed. Inflorescence terminal, cymose, usually few-flowered. Flowers large to mediocre; sepals foliaceous, 5; petals 5-10, free or barely united at the base; stamens 10 to very numerous, free or united at the base of the filaments, wholly fertile or the outermost becoming petaloid and sterile; ovary inferior, 1-celled, with few to numerous ovules borne upon 3-7 parietal placentas, the style elongate, filiform, the stigma scarcely dilated, capitate or obscurely divided. Fruit an apically dehiscent 3- to 7-valved capsule.

A genus of nearly 100 species, principally in the western United States and Mexico, but extending along the Pacific coast of South America to Patagonia. A single species is known from Panama.

1. *MENTZELIA ASPERA* L. Spec. Pl. ed. 1. 516. 1753.

*Mentzelia stipitata* Presl, Rel. Haenk. 2:40. 1831.

*Mentzelia pedicellata* Presl, Epim. Bot. 246. 1849.

*Acrolasia squalida* Hook. f. in Trans. Linn. Soc. 20:222. 1851.

Slender erect or sprawling annuals. Stems slender, dichotomous, up to about 6 dm. long, rather thinly covered with short weak glochidiate hairs. Leaves alternate, rather sparse, shortly but evidently petiolate, the blade rather hastately 3-lobed and irregularly serrate, acuminate, broadly obtuse at the base, about 8 cm. long and 4 cm. broad or somewhat larger toward the base of the stem, diminishing gradually toward the tip, lax and thinly membranaceous, weakly and variously strigillose with simple hairs above and below, the petiole about 5 mm. long. Flowers in few-flowered leafy-bracted cymes at the tips of the branches, mediocre, pale orange or salmon, sessile or essentially so; hypanthium narrowly cylindrical, about 1 cm. long and 1 mm. broad at anthesis, densely covered with slender glochidiate hairs, the calyx lobes broad trigonal at the base, very narrowly subcaudate-acuminate, nearly as long as the hypanthium, sparsely strigillose but without glochidiate hairs; petals 5, obovate, up to 1 cm. long and 5 mm. broad, spreading, pale orange or salmon, slightly united at the base; stamens about 20-30, all fertile, but the outermost somewhat longer and with enlarged somewhat petaloid filaments, somewhat shorter than the petals. Capsule narrowly cylindrical but slightly attenuate toward the base, up to about 2.5 cm. long and 5 mm. broad, 3-valved, covered with the persistent glochidiate hairs.

One of the most widespread species of the genus, occurring from Arizona to Argentina. Rather frequent in dry thickets upon the Pacific slope of Panama.

CANAL ZONE: Balboa Heights, *Greenman & Greenman 5055*; Ancón Hill, *Greenman & Greenman 5114*, *Standley 26360*; between Corozal and Ancón, *Pittier 2209*; Gamboa, *Pittier 4793*; Sosa Hill, Balboa, *Standley 25256*, *32150*; Darién station, *Standley 31521*.

2. *KLAPROTHIA* HBK.

*KLAPROTHIA* HBK. Nov. Gen. & Sp. 6:96. 1823.

Herbaceous annuals, the stems and foliage rather inconspicuously hispidulous to



essentially glabrous, without stinging hairs. Leaves opposite, distinctly petiolate, serrate. Inflorescence terminal, diffusely cymose, bearing rather numerous small 4-merous flowers. Hypanthium subglobose, the calyx lobes 4, broadly trigonal; petals 4, free; stamens in antepetalous groups of 4-5, with slender minutely papillate filaments; staminodia in antesepalous groups of 4-5, with slender pilosulose filaments barely united at the base and incised flabelliform sterile anthers; ovary 4-carpellary, 1-celled, with 1-2 ovules upon the 4 parietal placentas; style filiform, the stigma very obscurely divided. Fruit a small septicidally 4-valved capsule.

A monotypic genus of relatively high elevations extending from Costa Rica to Venezuela and Bolivia.



Fig. 8. *Klapprothia mentzelioides*

1. *KLAPROTHIA MENTZELIODES* HBK. Nov. Gen. & Sp. 6:96. 1823.

Weak erect or sprawling herbaceous annuals. Stems slender, branching infrequently, up to about 6 dm. long, usually less, inconspicuously pilosulose to essentially glabrous. Leaves opposite, rather sparse, lax and long-petiolate, the blade elliptic to ovate or lanceolate, acuminate, obtuse or somewhat attenuate at the base, rather evenly serrate, up to about 10 cm. long and 5 cm. broad, delicately membranaceous, minutely strigillose upon both surfaces, the petiole slender, up to about 3 cm. long, commonly horizontally spreading or somewhat reflexed. Inflorescence terminal, laxly cymose, bearing rather numerous small white shortly pedicellate flowers. Hypanthium subglobose, about 2 mm. broad, minutely and densely hirsutulose, the calyx lobes broadly trigonal, about 1 mm. long; petals broadly oval or obovate, somewhat cucullate, 6-8 mm. long. Stamens and staminodia of the

genus, about as long as the petals. Capsules oblongoid, about 4-6 mm. long and 2-4 mm. broad, persistently hirsutulose.

Rather frequent in the moist highland forests at elevations of 1500-2000 m.

BOCAS DEL TORO: Robalo Trail, northern slopes of Cerro Horqueta, Allen 4917, 5002.  
CHIRIQUI: Bajo Chorro, Woodson & Schery 650, Davidson 82.

### 3. LOASA Adans.

LOASA Adans. Fam. 2:501. 1763.

Ortiga Neck. Elem. 2:400. 1790.

Huidobria C. Gay, Fl. Chil. 2:438. 1846.

Annual or perennial herbs or subshrubs, erect or sprawling, rarely twining, beset in nearly all parts with scabrous, stinging hairs. Leaves alternate or opposite, variously incised and lobed. Inflorescence cymose, terminal or lateral, occasionally reduced to a solitary flower. Flowers mediocre to large, usually 5-merous, rarely 6- to 7-merous; sepals foliaceous, open in aestivation; petals valvate or imbricate, somewhat clawed; stamens numerous, in antepetalous clusters, the filaments elongate, united at the base; staminodia united into conspicuous more or less saccate antesepalous petaloid scales; ovary inferior, 1-celled, with usually numerous ovules borne upon 3-5 parietal placentas, the style usually shortly columnar, the stigma obscurely divided. Fruit a 3- to 5-valved capsule.

75-100 species, extending from Mexico to Patagonia, but particularly numerous in Peru and Chile. The Loasas sting probably more painfully than any nettle, and the quality sometimes is not completely lost from herbarium specimens.

- |  |                |
|--|----------------|
| a. Leaves pinnate or very deeply pinnatifid above; flowers mediocre, about 2.5 cm. in diameter, the petals white.....        | 1. L. RUDIS    |
| aa. Leaves only moderately lobed and incised.  |                |
| b. Leaves somewhat longer than broad, somewhat pinnately lobed; flowers about 5 cm. in diameter, the petals pale green.....  | 2. L. GRANDIS  |
| bb. Leaves about as long as broad, somewhat palmately lobed; flowers about 15 cm. in diameter, the petals bright orange..... | 3. L. SPECIOSA |

#### 1. LOASA RUDIS Benth. Pl. Hartw. 75. 1839.

*Loasa rhoeadifolia* Schlecht. in Linnaea 14:382. 1840.

*Loasa bipinnata* Donn. Sm. in Bot. Gaz. 23:7. 1897.

*Loasa triphylla* Juss. var. *δ rudis* (Benth.) Urb. & Gilg, in Nova Acta, Abh. K. Leop.-Carol. Deutsch Akad. Naturfor. 76:239. 1900.

Weak annual herbs up to about 1 m. tall. Leaves alternate, rather sparse, pinnate or very deeply pinnatifid above, the uppermost greatly reduced and simple, the lower shortly petiolate, up to about 15 cm. long and 9 cm. broad, with 3-5 pairs of oblong-elliptic coarsely serrate leaflets or lobes. Flowers several in laxly monochasial, leafy-bracted terminal cymes; pedicels 5-10 mm. long; calyx lobes 5, broadly ovate-trigonal, obtuse, 6 mm. long and broad; petals 5, broadly spatulate, 1 cm. long, widely spreading, white; staminodia profoundly saccate, about 5 mm. long, striped with red or pink. Capsules erect upon the accrescent pedicels, rather narrowly campanulate, up to 2 cm. long and 1 cm. broad, densely hispid, the persistent calyx lobes accrescent and about half as long as the capsule.

Fig. 9. *Loasa rudis*

Southern Mexico to Panama, where the plant is known locally as *pringamoza* or *pringamosca*. A frequent herb in pastures and forest clearings at elevations of 1500–2000 m.

CHIRIQUI: upper Río Chiriquí Viejo valley, near Cerro Punta, G. White 39; Bajo Chorro, Boquete District, Davidson 277, Woodson & Schery 645; Casita Alta, Volcán de Chiriquí, Woodson, Allen & Seibert 936.

This plant probably is not conspecific with true *L. triphylla* of Ecuador and Peru which, as the name suggests, has palmately divided leaves. However, our plant may eventually prove to be conspecific with *L. papaverifolia* HBK. which extends from Colombia and Venezuela to Chile; in this case, *L. rudis* will have to be superseded by the earlier name.

2. *LOASA GRANDIS* Standl. in Journ. Wash. Acad. Sci. 17:12. 1927.

Very large coarse herbs up to about 4 m. tall. Leaves alternate, rather sparse, long-petiolate, broadly oval and divided into 6–8 broad coarsely serrate lobes, up to 4 dm. long and 3 dm. broad, gradually reduced above, the petiole 3–8 cm. long. Flowers several or rather few in leafy-bracted, lax terminal cymes; pedicels about 2 cm. long; calyx lobes 5, broadly ovate, about 1 cm. long, sparsely serrate-dentate; petals 5, pale green, cucullate, broadly obovate, about 2.5 cm. long, 1.5 cm. broad; scales broadly oval-cucullate, 5–6 mm. long, entire or broadly 3-lobed at the tip (exappendiculate?) 3-nerved, the opposite staminodia narrowly acicular, long-acuminate, minutely puberulent immediately above the slightly enlarged base, about 1 cm. long; stamens in groups of about 12 opposite the petals, the filaments about 1.5 cm. long, the anthers about 2 mm. long; roof of the ovary about 1 cm. in diameter, densely arachnoid-villous; style about 5 mm. long. Capsules broadly turbinate, about 2 cm. long, dehiscent with 5 broad valves alternate with the calyx lobes; seeds innumerable, about 1 mm. long or somewhat less.

Panama and Costa Rica (?), in clearings of moist forest, 70–1000 m. elev.

CANAL ZONE: forest along banks of Quebrada La Palma and Cañon of Río Chagres, Dodge & Allen 17336. COCLÉ: north rim of El Valle de Antón, Allen 1658.

The type of *L. grandis* comes from Guanacaste, Costa Rica. I have not been able to detect the three small conic appendages below the apex of the scales described by Standley for the Costa Rica plants.

3. *LOASA SPECIOSA* Donn. Sm. in Bot. Gaz. 23:8. 1897.

Large coarse weak herbs up to 2 m. tall, abundantly covered with long brown stinging hairs. Leaves opposite or subopposite, long-petiolate, the blade about as long as broad, somewhat palmately lobed and serrate in the manner of a maple leaf, up to 15 cm. long and broad or somewhat larger below, the petiole up to 12 cm. long. Flowers solitary or in few-flowered terminal cymes, the pedicels up to 6 cm. long; calyx lobes 5, ovate-lanceolate, acuminate, about 3 cm. long; petals 5, bright orange, broadly oval, 5–6 cm. long, flat or essentially so, slightly spreading; scales about 1.8 cm. long, broadly truncate-triangular, the tip unequally 4-lobed, the

Fig. 10. *Gronovia scandens*

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lateral lobes somewhat longer, with 2 broadly oval sacs at the base, the staminodia 2, about 2.5 cm. long, narrowly acicular but greatly bulbous at the base, minutely and closely aculeolate; stamens in groups of about 14 opposite the petals, the filaments glabrous, about 2 cm. long, the anthers about 2 mm. long; style slender, 1.5 cm. long, minutely hispidulose toward the base, the stigma subcapitate. Capsules narrowly campanulate, about 2 cm. long and 1 cm. broad, bearing innumerable reticulate seeds about 1 mm. broad upon usually 3 parietal placentas.

Highland Costa Rica and western Panama, in forest clearings at about 2000-2500 m. elev.

CHIRIQUÍ: Bajo Chorro, Boquete District, *Davidson 445*; vicinity of Cerro Punta, *Allen 3486*.

With its bright orange flowers 15 cm. or more in diameter, this is one of the most showy herbs of the Chiriquí mountains, but is also one of the most painful *ortigas*.

#### 4. GRONOVIA L.

GRONOVIA L. *Sp. Pl. ed. 1. 202. 1753.*

Slender annual twiners covered with weak uncinat hairs on all parts. Leaves alternate, long-petiolate, the blade very deeply and palmately divided and coarsely dentate, broadly ovate-reniform, deeply cordate. Inflorescence extra-axillary, several times dichasial with the ultimate branches monochasial, bearing numerous rather small sessile flowers. Calyx lobes 5, subfoliaceous, valvate; petals 5, free, open in aestivation; stamens 5, antesealous, all fertile; ovary 1-celled, containing a solitary pendulous ovule, the style rather slender, the stigma subcapitate. Fruit a small 5-winged cypsela crowned by the persistent calyx.

Two species, extending from Mexico to Venezuela and Peru.

##### 1. GRONOVIA SCANDENS L. *Sp. Pl. ed. 1. 202. 1753.*

Slender annual twiners, weakly uncinat-pilose in all parts. Leaves rather sparse, long-petiolate, the blade broadly ovate-reniform, deeply cordate, up to 8 cm. long and 9 cm. broad, deeply and palmately divided into usually five unequal, narrowly acuminate lobes, the middle somewhat longest, entire, the lateral decreasingly smaller and with 1 to several broad dentate incisions, the petiole up to 7-8 cm. long. Inflorescence about equaling the leaves, compound, bearing numerous rather small sessile flowers. Flowers greenish yellow; sepals oblong-lanceolate, acute, 5-6 mm. long; petals rather narrowly spatulate, acuminate, about 3 mm. long; stamens about 4 mm. long, the filaments scarcely longer than the anthers. Fruits pentagonal-obovoid, about 3-4 mm. long, decurrently 5-winged from the tip, crowned by the persistent, somewhat accrescent sepals.

Southern Mexico to Venezuela and Ecuador, in lowland thickets.

PANAMÁ: vicinity of Old Panamá, *Woodson & Schery 948*.

## BEGONIACEAE

BY LYMAN B. SMITH AND BERNICE G. SCHUBERT

1. *BEGONIA* L.*BEGONIA* L. Sp. Pl. 1056. 1753; A. DC. in DC. Prod. 15<sup>1</sup>:278. 1864.

- Eupetalum* Lindl. Nat. Syst. ed. 2, 440. 1836.  
*Trilomisa* Raf. Fl. Tellur. 2:91. 1836.  
*Meziera* Gaud. Bot. Voy. Bonite, pl. 32. 1839.  
*Falkea* Koenig ex Steud. Nomencl. Bot. ed. 2, 1:194. 1840.  
*Diploclinium* Lindl. Veg. Kingd. 319. 1847.  
*Platyclinium* T. Moore in Moore & Ayers, Gard. Mag. Bot. 2:153. 1850. Nom. prov.  
*Sphendanthra* Hassk. in Versl. Acad. Wetensch. Amsterdam 4:139. 1855.  
*Nephromischus* Kl. in Ind. Sem. Hort. Berol. App. 1. 1855.  
*Huszia* Kl. in Monatsber. Akad. Berlin 121. 1854.  
*Saueria* Kl. in Monatsber. Akad. Berlin 122. 1854.  
*Barya* Kl. in Monatsber. Akad. Berlin 122. 1854.  
*Knesebeckia* Kl. in Monatsber. Akad. Berlin 122. 1854.  
*Gaerdia* Kl. in Monatsber. Akad. Berlin 123. 1854.  
*Trendelenburgia* Kl. in Monatsber. Akad. Berlin 123. 1854.  
*Ewaldia* Kl. in Monatsber. Akad. Berlin 123. 1854.  
*Gurtia* Kl. in Monatsber. Akad. Berlin 123. 1854.  
*Scheidweileria* Kl. in Monatsber. Akad. Berlin 123. 1854.  
*Lepisia* Kl. in Monatsber. Akad. Berlin 123. 1854.  
*Riessia* Kl. in Monatsber. Akad. Berlin 123. 1854.  
*Mitscherlichia* Kl. in Monatsber. Akad. Berlin 123. 1854, as "*Mitcherlichia*".  
*Rachia* Kl. in Monatsber. Akad. Berlin 124. 1854.  
*Petermannia* Kl. in Monatsber. Akad. Berlin 124. 1854.  
*Augustia* Kl. in Monatsber. Akad. Berlin 124. 1854.  
*Gireoudia* Kl. in Monatsber. Akad. Berlin 125. 1854.  
*Rossmannia* Kl. in Monatsber. Akad. Berlin 125. 1854.  
*Magnusia* Kl. in Monatsber. Akad. Berlin 125. 1854.  
*Haagea* Kl. in Monatsber. Akad. Berlin 125. 1854.  
*Tittelbachia* Kl. in Monatsber. Akad. Berlin 126. 1854, as "*Titelbachia*".  
*Pritzelia* Kl. in Monatsber. Akad. Berlin 126. 1854.  
*Wageneria* Kl. in Monatsber. Akad. Berlin 126. 1854.  
*Doratometra* Kl. in Monatsber. Akad. Berlin 126. 1854.  
*Pilderia* Kl. in Monatsber. Akad. Berlin 127. 1854.  
*Donaldia* Kl. in Monatsber. Akad. Berlin 127. 1854.  
*Moschkowitzia* Kl. in Monatsber. Akad. Berlin 127. 1854.  
*Stibadotheca* Kl. in Monatsber. Akad. Berlin 127. 1854, as "*Stiradotheca*".  
*Casparya* Kl. in Monatsber. Akad. Berlin 127. 1854.  
*Isopteryx* Kl. in Monatsber. Akad. Berlin 127. 1854, as "*Isopteris*".  
*Sassea* Kl. in Monatsber. Akad. Berlin 128. 1854.  
*Reichenheimia* Kl. in Abh. Akad. Berlin 1854:54. 1855.  
*Steineria* Kl. in Abh. Akad. Berlin 1854:64. 1855.  
*Trachelanthus* Kl. in Abh. Akad. Berlin 1854:82. 1855.  
*Cyathocnemis* Kl. in Abh. Akad. Berlin 1854:100. 1855.  
*Weilbachia* Kl. & Oerst. ex Kl. in Abh. Akad. Berlin 1854:119. 1855.  
*Lauchea* Kl. in Abh. Akad. Berlin 1854:121. 1855.  
*Platycentrum* Kl. in Abh. Akad. Berlin 1854:123. 1855.  
*Putzysia* Kl. in Abh. Akad. Berlin 1854:134. 1855.  
*Trachelocarpus* Muell. in Walp. Ann. Bot. 4:909. 1857.  
*Cladomischus* Kl. ex A. DC. in DC. Prod. 15<sup>1</sup>:278. 1864.  
*Irma* Bout. ex A. DC. in DC. Prod. 15<sup>1</sup>:406. 1864.



*Begoniella* Oliver, in Trans. Linn. Soc. 28:513. 1873.

*Semibegoniella* C. DC. in Bull. Herb. Boiss. II. 8:327. 1908.

Annual or perennial herbs, shrubs or rarely small trees. Stem elongate and succulent or woody or a cylindrical rhizome or sometimes reduced to a tuberous rhizome, sometimes climbing. Leaves usually alternate or rarely subverticillate, entire, serrate, lobed or digitately compound, usually asymmetric, sometimes peltate, stipules 2, free, persistent or deciduous. Peduncles mostly axillary. Inflorescence usually cymose, sometimes 1-flowered or racemose. Cymes regular or strongly one-sided, usually dichotomous, unisexual or bisexual. Flowers monoecious. Tepals free or rarely connate, usually 4 staminate in two pairs and 5 pistillate. Stamens indefinite, inserted on the receptacle, filaments free or united. Styles usually 3, free or connate, usually bifid, ovary inferior, placentae axile, simple or divided. Fruit capsular, usually bearing 3 unequal wings.

- a. Plants acaulescent or subacaulescent with the leaves clustered near the apex of the rhizome, or with slender creeping stolons if the internodes are elongate.
- b. Leaves peltate.
- c. Cymes strongly unilateral; capsule-wings slightly unequal; leaves 2-12.5 cm. long.....
- cc. Cymes regular; capsule-wings very unequal; leaves 17-40 cm. long.
- bb. Leaves basifixed.
- c. Cymes strongly unilateral.
- d. Stipules ecarinate, coarsely reticulate-nerved; staminate and pistillate tepals 2; largest capsule-wing as high as wide.....
- dd. Stipules alate-carinate with fine inconspicuous nerves; staminate tepals 4; largest capsule-wing wider than high.....
- cc. Cymes regular.
- d. Branches of the cyme 3 or 4 at each node; inflorescence many-flowered.....
- dd. Branches of the cyme 2 at each node.
- e. Plants or at least the petioles densely vestite.
- f. Indument of the petioles consisting of linear trichomes.
- g. Cyme few-flowered; tepals pubescent, the staminate 4, the pistillate 3; slender stolons with elongate internodes often present; capsule reflexed.....
- gg. Cyme many-flowered; tepals glabrous, 2 each; capsule erect.....
- ff. Indument of the petioles consisting of lacerate scales; tepals 2.
- g. Cyme not at all umbelliform; capsule erect
- h. Largest capsule-wing narrower than high; leaves entire or slightly serrate, coarsely ciliate.....
- hh. Largest capsule-wing wider than high; anthers much shorter than the filaments; leaves ciliate-denticulate.....
- gg. Cyme umbelliform with greatly reduced terminal branches; capsule decurved; anthers longer than the filaments.....
- ee. Plants completely glabrous.
- f. Pistillate tepals 2 or 3; pistillate bracteoles apparently lacking.
- g. Tepals and upper bracts glandular; staminate tepals nearly equal; stamens on a column; pistillate tepals 2.....
- gg. Tepals and bracts eglandular; staminate tepals very unequal; stamens free, anthers longer than the filaments; pistillate tepals 3.....
- ff. Pistillate tepals 4; pistillate bracteoles orbicular, entire; staminate tepals very unequal; anthers shorter than the filaments.....
- aa. Plants with an erect or ascending stem and distinct internodes.

1. *B. CONCHIFOLIA*  
2. *B. NELUMBIIFOLIA*

3. *B. PLEBEJA*  
4. *B. GARAGARANA*

5. *B. QUATERNATA*

6. *B. CARLETONII*  
7. *B. VILLIPETIOLA*

8. *B. STRIGILLOSA*  
9. *B. STIGMOSEA*

10. *B. VESTITA*

11. *B. BREVICYMA*

12. *B. MUCRONISTIPULA*

13. *B. DAVIDSONIAE*

- b. Leaves nearly symmetric, ovate..... 14. *B. GLABRA*  
 bb. Leaves distinctly asymmetric.  
 c. Soft low annuals; tepals not over 3.5 mm. long.  
 d. Capsule-wings subequal, lunate; stamens free; leaves soon glabrous..... 15. *B. SEMIOVATA*  
 dd. Capsule-wings very unequal; stamens on a short column; leaves appressed-pilose above..... 16. *B. FILIPES*  
 cc. Coarse herbs or shrubs; tepals larger.  
 d. Leaves palminerved, transverse or strongly oblique.  
 e. Bracts persistent, fimbriate; pistillate tepals 5; staminate tepals 4..... 17. *B. FISCHERI*  
 ee. Bracts deciduous, entire; pistillate tepals 2 or 3.  
 f. Cymes few-flowered; peduncles short; capsule-wings equal or subequal; pistillate tepals 3.  
 g. Plant pubescent at least on the underside of the leaves; capsule scarcely if at all beaked..... 18. *B. OAXACANA*  
 gg. Plant glabrous except for a ring of trichomes at the apex of the petiole; capsule slenderly beaked..... 19. *B. UDILVESTIS*  
 ff. Cymes many-flowered; peduncles elongate; capsule-wings very unequal; pistillate tepals 2.  
 g. Secondary branches much reduced making the inflorescence appear umbellate, young inflorescence enclosed by two large bracts; leaves pubescent..... 20. *B. INVOLUCRATA*  
 gg. Secondary branches normal; inflorescence distinctly and regularly cymose; leaves glabrous..... 21. *B. MULTINERVIA*  
 dd. Leaves penninerved, straight or slightly oblique.  
 e. Ovary and capsule equally 3-horned from the upper part of the angles; cymes few-flowered.  
 f. Leaves dimidiate at base; anthers linear; pistillate tepals 5; styles multifid..... 22. *B. URTICAE*  
 ff. Leaves deeply cordate at base; anthers subglobose; pistillate tepals 3; styles bifid..... 23. *B. HEYDEI*  
 ee. Ovary bearing 3 wings which are attached the full length of the angles and are usually distinctly unequal.  
 f. Capsule-wings subequal; leaves falcate, oblanceolate, acuminate..... 24. *B. TONDUZII*  
 ff. Capsule-wings strongly unequal.  
 g. Leaves subulate-dentate; cymes globose, many-flowered; staminate tepals 4, subequal..... 25. *B. OPULIFLORA*  
 gg. Leaves with flat acute not subulate teeth.  
 h. Pistillate tepals 5; styles multifid; staminate tepals 4; very unequal..... 26. *B. GUADUENSIS*  
 hh. Pistillate tepals 2 or rarely 3; staminate tepals 2 (or if 3 or 4 then the styles merely bifid).  
 i. Internode very short; plants scandent; staminate tepals 4..... 27. *B. ESTRELLENSIS*  
 ii. Internodes elongate; plants usually erect; staminate tepals 2 (rarely 3 or 4).  
 j. Capsule 10-12 mm. high exclusive of the wings; cymes moderately floriferous..... 28. *B. SEEMANNIANA*  
 jj. Capsule 6-10 mm. high exclusive of the wings; cymes densely floriferous.  
 k. Leaves 5-7.5 (-11) cm. long, 2.5-3.7 (-4.7) cm. wide, serrate-denticulate..... 29. *B. CARPINIFOLIA*  
 kk. Leaves 8.5-15 cm. long, 4-7.5 cm. wide, somewhat denticulate..... 30. *B. CONVALLARIODORA*

1. *BEGONIA CONCHIFOLIA* A. Dietr. in Allg. Gartenzeit. 19:258. 1851.

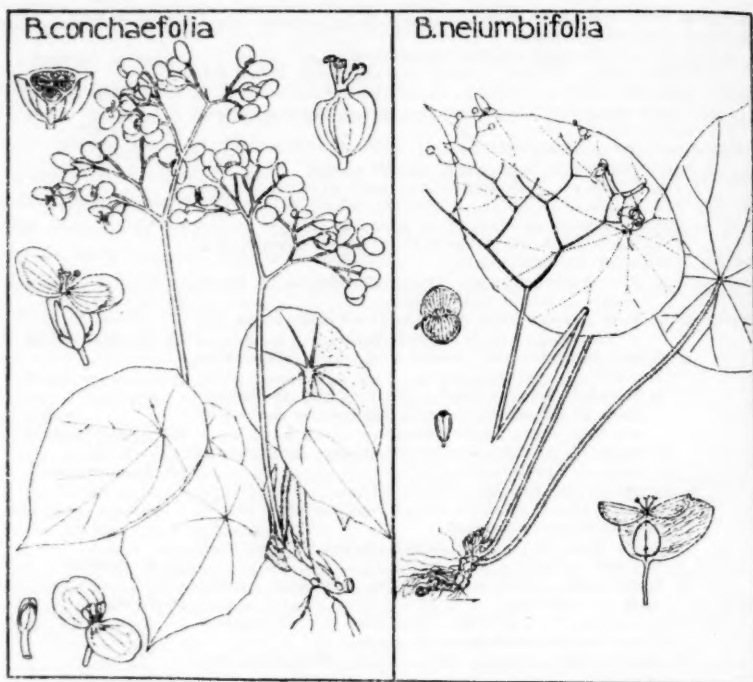
*Begonia scutellata* Liebm. in Kjoeb. Vidensk. Meddell. 1852:9. 1853.

*Gireoudia conchifolia* Kl. in Monatsber. Akad. Berlin 125. 1854.

*Gireoudia warszewicziana* Hort. ex A. DC. in DC. Prod. 15<sup>1</sup>:338. 1864, nomen in synon.

*Begonia pumilio* Standl. in Ann. Missouri Bot. Gard. 27:322. 1940, non Irmscher, 1929.

Herbaceous. Rhizome oblique, 5 mm. thick, internodes very short. Leaves

Fig. 11. *Begonia conchifolia* and *B. nelumbiifolia*

peltate, broadly ovate, acuminate, 7-8-nerved, entire or dentate at the ends of the nerves, 2-12.5 cm. long, nearly or quite glabrous above, rufous-pilose beneath especially on the nerves, fleshy, petioles 3-10 cm. long, rufous-pilose, stipules persistent, ovate, setose-acuminate, brown, glabrous or sparsely pilose. Peduncles much exceeding the leaves, to 15 cm. long, rufous-pilose. Cymes bisexual, strongly unilateral and often much longer than wide, few- to many-flowered. Bracts deciduous, small, lanceolate to obovate, entire, setose-ciliate. Pedicels 4-12 mm. long. Staminate tepals 2, suborbicular, 4-5 mm. long, entire, pink. Stamens few, free. Pistillate bracteoles elliptic, nearly equaling the ovary. Pistillate tepals 2, like the staminate. Ovary 3-celled, placentae bilamellate, ovuliferous throughout, styles connate at base, stigmas lunate-capitate. Capsule erect, subglobose, wings slightly unequal, sublunate, angled near apex.

Honduras, Costa Rica, Panama.

COCLÉ: epiphytic, vicinity of La Mesa, hills north of El Valle de Antón, alt. 1000 m., Allen 2297; vicinity of El Valle de Antón, Allen 2925. PANAMÁ: on boulders, Cerro Campana, Allen 2089.

2. *BEGONIA NELUMBIIFOLIA* Schlecht. & Cham. in *Linnaea* 5:604. 1830.

*Begonia derycxiana* Lem. in Hort. Univ.  
5: misc. 355. 1844.

*Gireoudia nelumbiifolia* Kl. in Monatsber.  
Akad. Berlin 125. 1854.

*Begonia caudilimba* C. DC. in Smithson.  
Misc. Coll. 69: no. 12:9. 1919.

Herbaceous. Rhizome repent, short, 15 mm. thick, setose, internodes extremely short. Leaves peltate, obliquely very broadly ovate or subelliptic, 7-9-nerved, evenly rounded except for the abruptly acuminate apex or slightly produced at the ends of the nerves, 17-40 cm. long, 10-28 cm. wide, remotely denticulate, soon glabrous, the margin ciliate and sometimes purple, thin, petioles 15-45 cm. long, to 8 mm. thick, sparsely rufous-hirsute, becoming glabrous, stipules persistent, lanceolate, over 2 cm. long, entire, rather firm, pilose. Peduncle usually exceeding the leaves, to 66 cm. long, 6 mm. thick, soon glabrous. Cyme regular, much branched, diffuse, 2-5 dm. broad. Bracts deciduous, ovate, obtuse. Pedicels slender, 9-22 mm. long. Staminate tepals 2, suborbicular, 6-8 mm. long, white. Stamens few, anthers narrowly obovate, equaling or longer than the filaments. Pistillate bracteoles lacking. Pistillate tepals 2, like the staminate. Ovary 3-celled, placentae bifid, ovuliferous throughout, styles connate at base, distinctly divided, the stigmatic surface linear, spiral, continuous. Capsule erect or somewhat nutant, broadly ovoid, 6-10 mm. long, wings very unequal, the largest ovate, obtuse, to 15 mm. wide, seeds ellipsoid, blunt.

Southern Mexico to Colombia.

CANAL ZONE: on rocky bank, forest along the Río Indio de Gatún, near sea level, Maxon 4866. DARIÉN: Chepigana District, Cana-Cuasi Trail (Camp 1), alt. 240 m., Terry 1623.

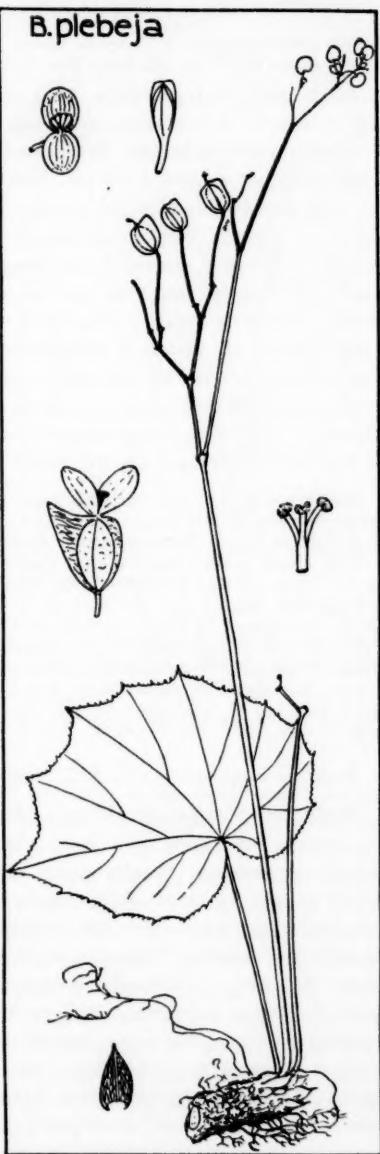


Fig. 12. *Begonia plebeja*

3. *BEGONIA PLEBEJA* Liebm. in Kjoeb. Vidensk. Meddel. 1852:8. 1853.*Begonia glandulosa* sensu J. D. Smith, Enum. Pl. Guat. etc. 4:182. 1895; 5:34. 1899.*Begonia uvana* C. DC. in Smithson. Misc. Coll. 69: no. 12:4. 1919.

Herbaceous, fuscous-villous when young. Rhizome usually repent, to 8 cm. long at least, 8–10 mm. thick, internodes very short. Leaves oblique, broadly ovate or elliptic, acute, palmately 7–8-nerved, denticulate, angulate-dentate or almost evenly rounded, cordate, 7–20 cm. long, thin, soon glabrous, petioles erect, 6–28 cm. long, usually soon glabrous, stipules persistent, imbricate, lanceolate, acuminate-setiferous, 1–2 cm. long, entire, heavily and closely reticulate-nerved. Peduncles exceeding the leaves, up to 22 cm. long. Cymes bisexual, strongly unilateral and usually much longer than wide, few- to many-flowered. Bracts deciduous, obovate, ciliate. Staminate tepals 2, broadly ovate, 5–9 mm. long, white or pale pink. Stamens about 15, filaments short, anthers oblong. Pistillate flowers bracteolate. Pistillate tepals 2, like the staminate. Ovary 3-celled, placentae bifid, ovuliferous on all sides, styles short-connate, stigmas lunate-capitate. Capsule suberect, oblong-ellipsoid, 12 mm. long, wings unequal, the largest subtriangular and as high as wide.

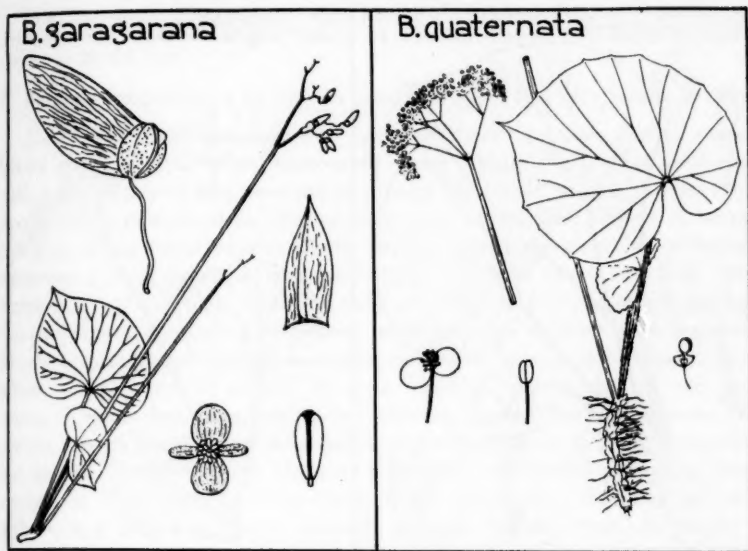
Southern Mexico and Central America.

CANAL ZONE: Las Cascadas Plantation, near Summit, Standley 25683, 25759, 25781, 29513; between Madden Dam and Saddle 11 near Alajuela, alt. 90–100 m., Dodge, Steyermark & Allen 16503; Westerly Arm of Quebrada Salamanca, alt. 70 m., Dodge, Steyermark & Allen 17008; forest along banks of Quebrada Fea, Q. Pura and Cañon of Río Chagres, alt. 70–100 m., Dodge & Allen 17408; forest along telephone trail between the Río Indio Hydrographic Station and the Natural Bridge of Río Puente, Dodge & Allen 17482. COCLÉ: vicinity of El Valle, alt. 800–1000 m., Allen 94. PANAMÁ: Old Panamá, Rose 18508; Taboga Island, Killip 3167; Standley 27966, Allen 1264; Río Tapia, Standley 26172, 28288; Juan Díaz, Standley 30583; along road between Panamá and Chepo, Dodge, Hunter, Steyermark & Allen 16683; Río La Maestra, alt. 0–25 m., Allen 58; San José Island, Johnston 83, 207, 322, 386, 436. VERAGUAS: Isla de Uva, Contreras group, Pittier 5109.

4. *BEGONIA GARAGARANA* C. DC. in Smithson. Misc. Coll. 69: no. 12:2. 1919.

Herbaceous, completely glabrous. Rhizome repent, only a small terminal section known, internodes very short. Leaves oblique or transverse, palminerved, strongly asymmetric, broadly ovate or elliptic, abruptly acuminate, shallowly cordate at base, to 24 cm. long, entire, petioles erect, 25 cm. long, stipules deciduous, lanceolate, acute, 2 cm. long, entire, alate-carinate, membranaceous with fine inconspicuous nerves. Peduncle much exceeding the leaves, to 75 cm. long. Cymes dichotomous, strongly asymmetric, lax, many-flowered, 15 cm. long. Bracts deciduous, unknown. Pedicels 24 mm. long. Staminate tepals 4, entire, glandular-punctate, the outer broadly obovate, 7–9 mm. long, the inner very narrow. Stamens few on a low torus, filaments very short, anthers narrowly obovoid, 2.5 mm. long, connective scarcely if at all produced. Pistillate flowers unknown. Capsule ovoid or ellipsoid, 8–10 mm. long, wings very unequal, the largest 26 mm. wide, styles deciduous, placentae bifid, ovuliferous throughout, seeds stalked, ellipsoid.

Endemic.

Fig. 13. *Begonia garagarana* and *B. quaternata*

DARIÉN: Cerro de Garagará, Sambú Basin, southern Darién, alt. 500-974 m., *Pittier* 5672. VERAGUAS: forested slopes of Cerro Tuté, vicinity of Santa Fé, alt. 750 m., *Allen* 4375.

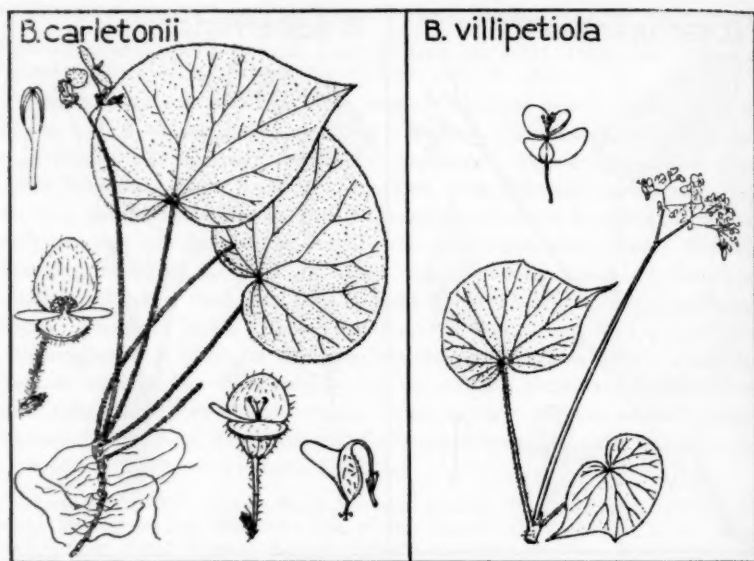
5. *BEGONIA QUATERNATA* Smith & Schubert, in Journ. Wash. Acad. Sci. 40:244. fig 1, p-s. 1950.

Stemless with the leaves clustered near the apex of the erect densely rooting rhizome, internodes very short; leaves transverse, very broadly elliptic, obliquely acuminate and also cuspidate opposite the principal nerves, deeply and narrowly cordate at base, 17 cm. long, 14 cm. wide, nearly glabrous above, below densely pilose on the nerves and sparsely elsewhere, petioles slender, 15-18 cm. long, densely vestite with reflexed lacerate fuscous scales, stipules early deciduous, unknown. Peduncles 4 dm. long, much exceeding the leaves, slender, glabrous. Inflorescence regularly cymose, 3-4-radiate, many-flowered, 13 cm. broad, glabrous. Bracts quickly deciduous, small, elliptic, entire. Flowers white (! *Allen*) but yellow when dry. Staminate tepals 2, suborbicular, 5 mm. long, entire. Stamens inserted on a short column, anthers ellipsoid, slightly shorter than the filaments. Pistillate bracteoles apparently lacking. Pistillate tepals 2, to 2.5 mm. long. Styles bifid, ovary 3-winged, wings equal, broadly ovate.

Endemic.

CHIRIQUÍ: vicinity of "New Switzerland", central valley of Río Chiriquí Viejo, alt. 1800-2000 m., January 6-14, 1939, *Allen* 1336.



Fig. 14. *Begonia carletonii* and *B. villipetiola*

The general habit of *Begonia quaternata* is reminiscent of that of *B. stigmosa*. However, the flowers of *B. quaternata* are much smaller, and its cyme has four primary rays, a character that is very rare if not unique in North American *Begonia*.

6. *BEGONIA CARLETONII* Standl. in Journ. Wash. Acad. Sci. 17:314. 1927.

Herbaceous. Rhizome slender with short internodes but also producing very slender stolons, with internodes 5–8 cm. long, setose-pilose. Leaves asymmetric, straight or oftener strongly oblique, broadly ovate, abruptly acuminate, cordate at base, 6–16 cm. long, thin, finely sinuate-dentate, ciliate, sparsely setose-pilose on both sides, paler beneath, petioles slender, 5–16 cm. long, reflexed-setose, stipules narrowly lanceolate, 9 mm. long, entire, thin, pilose. Peduncles shorter or longer than the leaves, slender, pilose. Cymes few-flowered, pilose. Bracts subpersistent, ovate or elliptic, obtuse, 3–5 mm. long, entire. Pedicels to 18 mm. long. Staminate tepals 4, entire, white, the outer broadly ovate, obtuse, 6–12 mm. long, sparsely pilose, the inner narrowly oblanceolate, shorter, glabrous. Stamens on a low torus, numerous, anthers obovate, somewhat shorter than the filaments, connective not produced. Pistillate bracteoles apparently wanting. Pistillate tepals 3, otherwise like the staminate. Ovary 3-celled, pilose, styles slightly connate at base, the stigmatic surface lunate. Capsule sharply reflexed, ellipsoid, 7 mm. long, wings very unequal, the largest reflexed from the lower half of the capsule, oblong, obtuse, 5 mm. wide, the others narrowly lunate.

Endemic.



BOCAS DEL TORO: Changuinola Valley, *Dunlap 206*; locality uncertain, *Carleton 206*.  
CHIRIQUI: Fish Creek Mountains, vicinity of Chiriquí Lagoon, *von Wedel 2271*; Fish  
Creek, *von Wedel 2222*.

7. *BEGONIA VILLIPETIOLA* C. DC. in Smithson. Misc. Coll. 69: no. 12:5. 1919.

Herbaceous. Rhizome short with extremely short internodes, rooting densely. Leaves strongly asymmetric, transversely ovate, abruptly acuminate and often with a second cusp or lobe more nearly opposite the petiole, cordate at base, 15–21 cm. long, ciliate-denticulate, thin, sparsely pilose above, more densely so beneath especially on the nerves, petioles slender, 15–25 cm. long, densely villous with linear trichomes, stipules deciduous, triangular-ovate, acuminate, 15–20 mm. long, pilose. Peduncle 18–37 cm. long, exceeding the leaves when in fruit, becoming glabrous. Cymes bisexual, regularly dichotomous, many-flowered, subdense, glabrous except for the bracts. Bracts quickly deciduous, the lowest large, broadly elliptic, entire, pilose. Flowers pink or white. Staminate tepals 2, suborbicular, 10 mm. long, entire. Stamens free, numerous, anthers obovate, shorter than the filaments, connective not produced. Bracteoles lacking. Pistillate tepals 2, like the staminate but smaller. Ovary 3-celled, placentae bilamellate, ovuliferous throughout, styles connate at base, stigmatic tissue linear, spiral, continuous. Capsule erect, subglobose, 4–5 mm. long, wings distinctly unequal, broadly ovate, the largest to 11 mm. wide.

Endemic.

CANAL ZONE: Mojinga Swamp near mouth of Río Chagres, alt. 1 m., *Allen 864*.  
COCLÉ: Bismark above Penonomé, *Williams 309*; vicinity of El Valle, alt. 600–1000 m.,  
*Allen 213, 238, 1184, 1664, 2906, 4216*.

8. *BEGONIA STRIGILLOSA* A. Dietr. in Allg. Gartenzeit. 19:330. 1851.

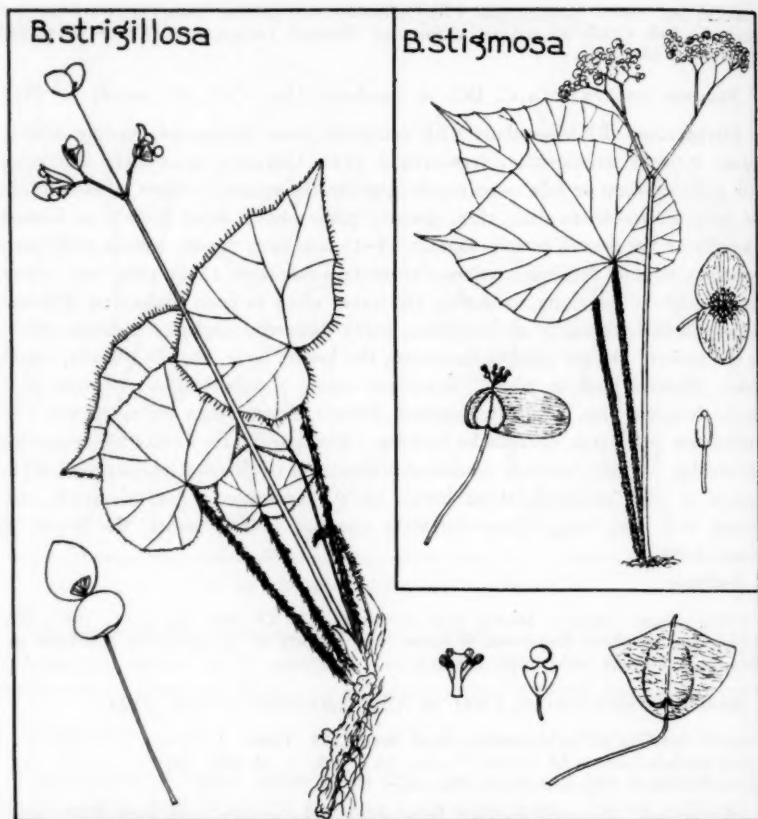
*Gireoudia strigillosa* Kl. in Monatsber. Akad. Berlin 125. 1854.

*Begonia daedalia* Lem. in Ill. Hort. 7: misc. 54. 1860. 8: pl. 269. 1861.

*Begonia barbana* C. DC. in Bull. Soc. Bot. Belg. 35: pt. 1:261. 1896.

Herbaceous. Rhizome varying from short and compact with very short internodes and imbricate stipules to slender and branching with distinct internodes. Leaves oblique, broadly ovate, acuminate, 7–17 cm. long, entire or slightly serrate, rounded to angulate-dentate, coarsely ciliate, glabrous above, sparsely long-pilose below especially on the nerves, often spotted or mottled, petioles to 18 cm. long, often spotted, bearing numerous reflexed fimbriate scales, stipules lanceolate with a setiferous apex and often fimbriate keel, persistent. Peduncle usually exceeding the leaves, sparsely pilose, often purple-spotted. Cyme 2–4-branched, subsymmetrical, mostly glabrous, diffuse. Bracts deciduous, elliptic, entire, mucronulate. Staminate tepals 2, suborbicular to obovate, 6–9 mm. long. Stamens few, the anthers oblong, obtuse. Pistillate bracteoles lacking. Pistillate tepals 2, like the staminate. Ovary 3-celled, placentae bifid, ovuliferous throughout, styles persistent, connate at base, somewhat bifid, stigmas linear. Capsule suberect, ovoid or elliptic-ovoid, locules to 10 mm. long, the two larger wings subtriangular or subobtusate to acuminate.

Guatemala, Costa Rica.

Fig. 15. *Begonia strigillosa* and *B. stigmosa*

Indefinite. Seed no. 7 from Mr. Clayton Kelly of Long Beach, California. Mr. Rudolf Ziesenhenné who sent us the specimen says that it is called water begonia for it grows only near streams in Panama. He considers it a distinct species but so far we are unable to separate it satisfactorily from *B. strigillosa*. *B. strigillosa* has been collected frequently in Costa Rica so that its occurrence in Panama is to be expected.

9. *BEGONIA STIGMOSA* Lindl. in Bot. Reg. 31: misc. 32. 1845.

*Begonia squarrosa* sensu Seemann, Bot. Herald 128. 1853, nomen, non Liebm. 1853.  
*Gireoudia stigmosa* Kl. in Monatsber. Akad. Berlin 125. 1854.

Herbaceous. Rhizome repent, to 12 cm. long, 1 cm. in diameter, coarsely lepidote, internodes very short and covered by the stipules. Leaves oblique and

strongly asymmetric, very broadly ovate or suborbicular, abruptly acuminate and usually with a second cusp more nearly opposite the petiole, cordate at base, 15–30 cm. long, scarcely if at all lobed, ciliate-denticulate, thin, glabrous above or with a few small white trichomes, the nerves beneath bearing trichomes like those on the petiole but smaller, petioles erect, to 38 cm. long, 4–10 mm. in diameter, covered with spreading to reflexed narrowly triangular lacerate pink scales 3–5 mm. long, stipules tardily deciduous, lanceolate, pilose, membranaceous, 15–20 mm. long. Peduncle 2–5 dm. long, 7 mm. in diameter, soon glabrous. Cymes bisexual, nearly regular, few- to many-flowered, 7–22 cm. long, lax, glabrous. Bracts quickly deciduous, oblong, acute, fimbriate. Pedicels slender, 7–23 mm. long. Flowers white or pink. Staminate tepals 2, suborbicular, cordate at base, 10–15 mm. long. Stamens free, very numerous, filaments much longer than the broadly oblong anthers, connective apiculate-produced. Bracteoles lacking. Pistillate tepals 2 like the staminate or rarely a smaller one inside the others. Ovary 3-celled, placenta bifid, ovuliferous throughout, styles bifid, the stigmatic tissue linear, spiral, continuous. Capsule erect, broadly ovoid, 6–8 mm. long, wings very unequal, the largest oblong or subdolabriform, 10–15 mm. wide, the others narrowly marginiform.

Southern Mexico, Central America and Colombia.

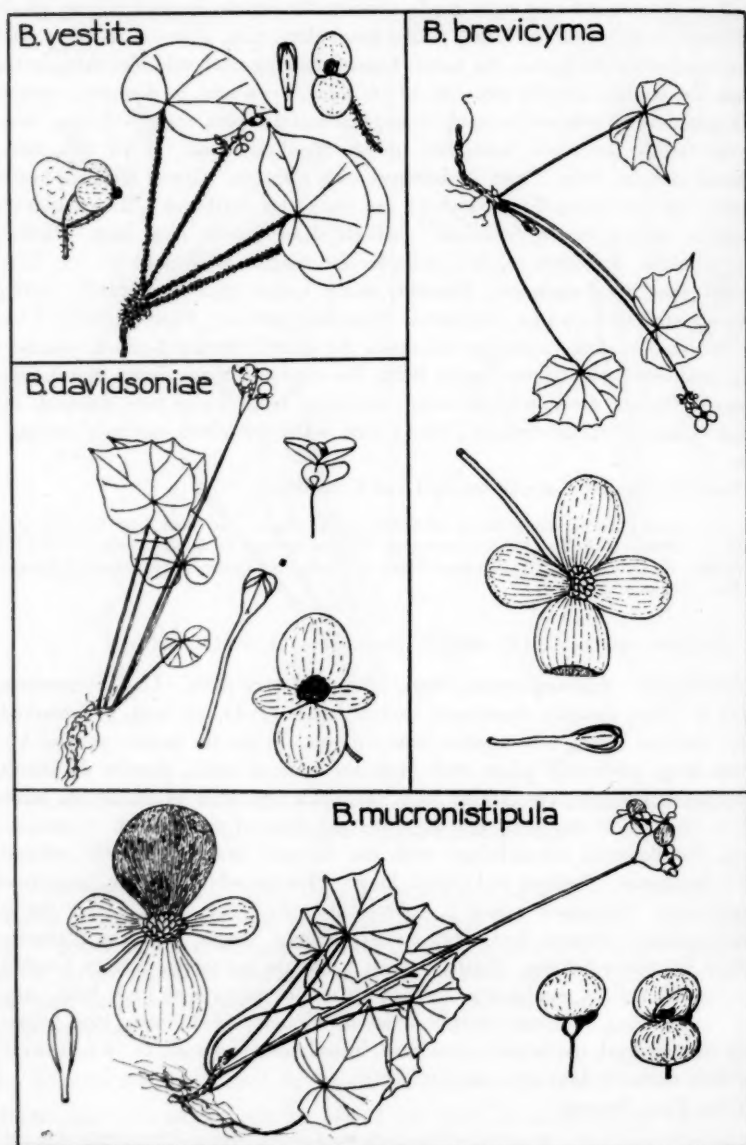
CANAL ZONE: forest along banks of Quebrada La Palma and Cañon of Río Chagres, 70–80 m., *Dodge & Allen 17368*. CHIRIQUÍ: forests around El Boquete, alt. 1000–1300 m., *Pittier 2896*; *Maxon 4947*; between Hato del Jobo and Cerro Vaca, eastern Chiriquí, alt. 700–1000 m., *Pittier 5411*.

10. *BEGONIA VESTITA* C. DC. in Bull. Herb. Boiss. II. 8:315. 1908.

Herbaceous. Rhizome repent, short, internodes very short. Leaves transverse, elliptic or ovate, abruptly acuminate, cordate at base, 7–18 cm. long, palminerved, entire, glabrous above, brown-pilose beneath especially on the nerves, petioles 15–25 cm. long, subdensely pilose with fimbriate scarious scales, stipules deciduous, ovate, membranaceous, 10–15 mm. long. Peduncle not much exceeding the leaves until in fruit, to 35 cm. long, bearing scales like those of the petioles. Cymes bisexual, few-flowered, subumbellate with the ultimate branches greatly reduced. Bracts deciduous. Pedicels 5–15 mm. long. Flowers white or pink, sometimes red-punctate. Staminate tepals 2, suborbicular, 5–7 mm. long, rather fleshy, sparsely pilose. Stamens free, few, anthers oblong, longer than the filaments. Pistillate bracteoles lacking. Pistillate tepals 2, like the staminate. Ovary 3-celled, placenta bilamellate, ovuliferous throughout, styles connate at base, bifid, stigmatic tissue spiral. Capsule sharply deflexed, ellipsoid, 10–12 mm. long, pilose, wings very unequal, the largest subreflexed, broadly ovate, obtuse, to 10 mm. wide, the others narrowly lunate or marginiform.

Costa Rica, Panama.

CHIRIQUÍ: rain forest, Bajo Chorro, Boquete District, alt. 1800 m., *Davidson 71*; epiphyte, vicinity of Bajo Chorro, alt. 1900 m., *Woodson & Schery 621*. COCLÉ: region north of El Valle de Antón, alt. 1000 m., *Allen 2906*.

Fig. 16. *Begonia*

11. *BEGONIA BREVICYMA* C. DC. in Smithson. Misc. Coll. 69: no. 12:3. 1919.

Herbaceous, glabrous. Rhizome 6-7 mm. in diameter, internodes very short. Leaves oblique, palminerved, strongly asymmetric, broadly subelliptic, abruptly acuminate with smaller cusps at the end of the principal nerves, cordate at base, 10-14 cm. long, petioles 16-24 cm. long, stipules persistent, broadly ovate, acuminate, lacerate near apex, 15 mm. long. Peduncles to 26 cm. long. Cyme regular, few-flowered. Bracts tardily deciduous, the lower ample and covering the young flowers, the upper much shorter than the pedicels, glandular. Pedicels to 25 mm. long. Staminate tepals 4, subequal, obovate, 17 mm. long, entire, pinkish white, glandular, the outer somewhat broader. Stamens on a column, numerous, anthers obovate, much shorter than the filaments, connective not produced. Bracteoles wanting. Pistillate tepals 2, broadly ovate, glandular. Wings of the ovary very unequal.

Endemic.

CHIRIQUÍ: epiphyte, vicinity of Bajo Chorro, alt. 1900 m., *Woodson & Schery 620*; humid forest around Los Siguas Camp, southern slope of Cerro de la Horqueta, Chiriquí, alt. 1700 m., *Maxon 5417*.

12. *BEGONIA MUCRONISTIPULA* C. DC. in Smithson. Misc. Coll. 69: no. 12:3. 1919.

Herbaceous, completely glabrous. Rhizome 6 mm. in diameter, internodes very short. Leaves oblique, palminerved, strongly asymmetric, broadly elliptic, apiculate opposite the principal nerves, otherwise entire, cordate at base, 10 cm. long, petioles erect, 16 cm. long, stipules persistent, broadly ovate, mucronate, nearly 2 cm. long (! C. DC.), entire, thin. Peduncle much exceeding the leaves, 37 cm. long. Cyme regular, few-flowered. Bracts deciduous, unknown. Pedicels to 15 mm. long. Staminate tepals 4, entire, the outer broadly obovate, 20 mm. long, one red and one white, the inner subspatulate, 15 mm. long, white. Stamens free, rather numerous, anthers oblong-obovate, slightly longer than the filaments. Pistillate bracteoles lacking. Pistillate tepals 3, the outer suborbicular, 8 mm. long (possibly immature), the inner one broadly ovate, much smaller. Ovary 3-celled, placentae bilamellate, ovuliferous throughout, styles 3, connate at base, bifid, stigmatic tissue spiral. Capsule-wings very unequal, the largest narrowly triangular, much wider than high, the others narrowly lunate.

Endemic.

CHIRIQUÍ: between the Río Ladrillo and Los Siguas Camp, southern slope of Cerro de la Horqueta, alt. 1200-1700 m., *Pittier 3172*.

13. *BEGONIA DAVIDSONIAE* Standl. ex Smith & Schubert, in Journ. Wash. Acad. Sci. 40:242. fig. 1, 1-o. 1950.

Stemless with the leaves clustered near the apex of the short prostrate densely rooting rhizome, glabrous, internodes very short; leaves oblique, broadly ovate, abruptly acuminate and also cuspidate at the ends of the principal nerves, deeply and narrowly cordate at base, 10 cm. long, 7 cm. wide, petioles slender, 17 cm.

long, stipules deciduous, triangular-ovate, acuminate, 12 mm. long, lacerate toward apex, thin. Peduncles slender, to 26 cm. long, exceeding the leaves. Cymes regular, few-flowered, dense. Bracts quickly deciduous. Flowers white or pink (! Davidson). Staminate tepals 4, entire, the outer suborbicular, 12 mm. long, the inner elliptic, 10 mm. long. Stamens numerous, anthers obovate, much shorter than the filaments, connective not produced. Pistillate bracteoles orbicular, entire. Pistillate tepals 4, like the staminate but smaller. Stigmatic tissue spiral, wings of the ovary very unequal, the largest oblong, obtuse, much wider than high, the others narrowly marginiform.

**Endemic.**

CHIRIQUÍ: rain forest, Bajo Chorro, Boquete District, alt. 1800 m., January 5, 1938, Davidson 38.

This species appears to be related to *Begonia brevicyma* and *B. mucronistipula* as indicated in the foregoing key, however, it has not been possible to ascertain the detailed structure of the styles and ovary without danger of seriously damaging the type, so there may be greater differences than appear.

**14. BEGONIA GLABRA** Aubl. Pl. Guian. 2:916. pl. 349. 1775.

*Begonia scandens* Sw. Prodr. 86. 1788.

*Begonia elliptica* HBK. Nov. Gen. & Sp. 7:180, pl. 641. 1825.

*Begonia lucida* Otto & Dietr. in Allg. Gartenz. 16:162. 1848.

*Begonia moritziana* Kunth & Bouché in Ind. Sem. Hort. Berol. 16. 1848.

*Begonia physalifolia* Liebm. in Kjoeb. Vidensk. Meddell. 1852:19. 1853.

*Wageneria moritziana* Kl. in Monatsber. Akad. Berlin 126. 1854, nomen.

*Wageneria lucida* Kl. in Monatsber. Akad. Berlin 126. 1854.

*Wageneria glabra* Kl. in Monatsber. Akad. Berlin 126. 1854.

*Wageneria deflexa* Kl. in Abh. Akad. Berlin 1854:113. 1855.

*Wageneria montana* Kl. in Abh. Akad. Berlin 1854:115. 1855.

*Begonia locellata* A. DC. in Ann. Sci. Nat. IV. 11:137. 1859.

Succulent herb to 9 m. high. Stem scandent, rooting at the nodes, glabrous. Leaves nearly symmetrical, broadly ovate, 4–15 cm. long, short-acuminate, rounded or barely cordate at base, sparsely serrate and ciliate to entire, often undulate, glabrous, petioles 1–8 cm. long, stipules persistent, ovate-oblong, mucronate, entire, 10–24 mm. long, membranaceous, red-brown. Peduncles axillary, 6–20 cm. long. Cymes many-flowered, diffuse. Bracts persistent, minute. Pedicels slender, 6–16 mm. long. Staminate tepals 4, white, the outer broadly obovate, 3–8 mm. long, the inner narrowly elliptic. Stamens free, few, anthers oblong. Pistillate tepals 5, 4–6 mm. long. Styles 3, 2-parted, completely covered by stigmatic papillae, placentae simple. Capsule 6–9 mm. long, largest wing oblong to triangular, 10–14 mm. wide, the other two marginiform, very narrow.

Southern Mexico and the West Indies to Guiana, Bolivia and Peru.

BOCAS DEL TORO: Fish Creek, vicinity of Chiriquí Lagoon, von Wedel 2204; Fish Creek Mountains, von Wedel 2278, 2345; Farm Six, Changuinola Valley, Dunlap 500. CHIRIQUÍ: llanos on slopes of Volcán de Chiriquí Viejo and along Río Chiriquí Viejo, alt. 1200 m., Allen 982. COCLÉ: vicinity of El Valle de Antón, alt. 600–1000 m., Allen 221, 1194, 1655. PANAMÁ: forests along Río Boquerón above Peluca Hydrographic Station, alt. 90 m., Hunter & Allen 655. VERAGUAS: forested slopes of Cerro Tuté, vicinity of Santa Fé, alt. 900 m., Allen 4357.



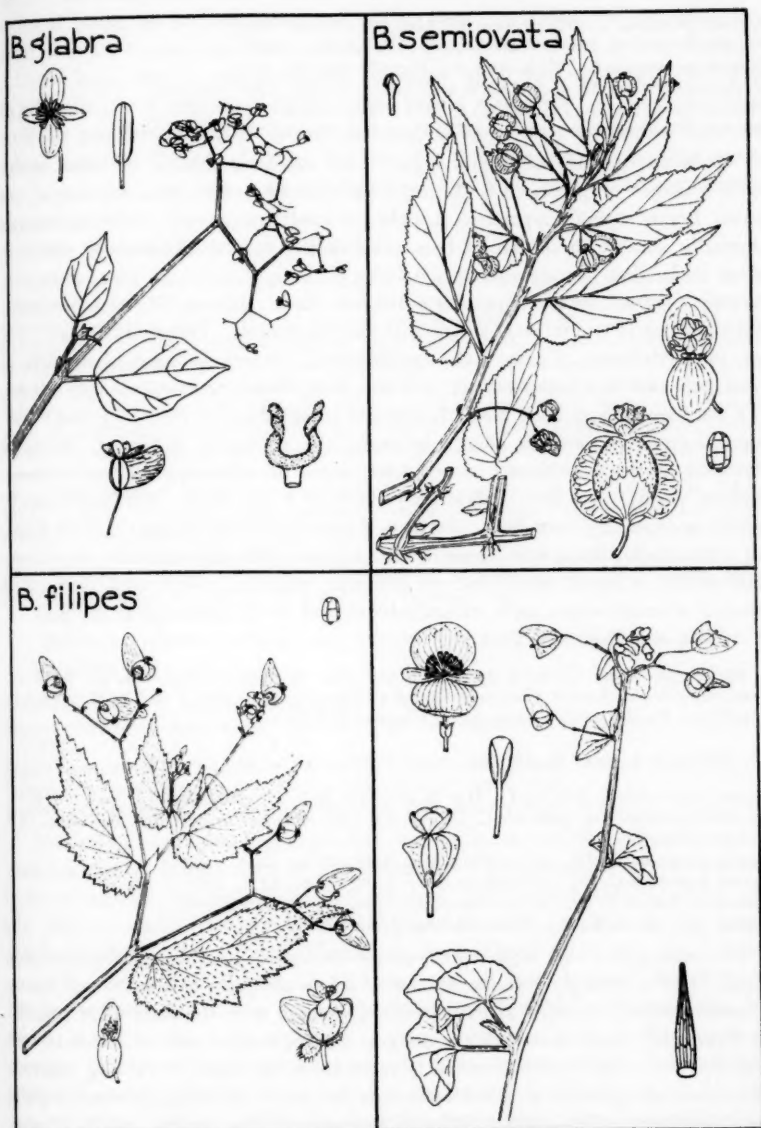


Fig. 17. *Begonia*  
(Lower right: *B. fischeri*)



15. *BEGONIA SEMIOVATA* Liebm. in Kjoeb. Vidensk. Meddel. 1852:22. 1853.*Begonia spruceana* A. DC. in Ann. Sci. Nat. IV. 11:142. 1859.*Begonia flexuosa* A. DC. in Ann. Sci. Nat. IV. 11:142. 1859.*Begonia guyanensis* A. DC. in Ann. Sci. Nat. IV. 11:142. 1859.*Hoffmannella rosea* Kl. in A. DC. in DC. Prod. 15<sup>1</sup>:299. 1864. Nomen.*Begonia rosea* (Kl.) A. DC. in DC. Prod. 15<sup>1</sup>:299. 1864.*Begonia guyanensis* var. *glaberrima* C. DC. in Bot. Gaz. 20:540. 1895.

Herbaceous, slender, 2–6 dm. high. Stem simple or slightly branched, essentially glabrous or glabrescent, prostrate to ascending, sometimes rooting at the nodes. Leaves strongly asymmetric, straight (or rarely transversely ovate) acuminate, unequally cuneate to cordate at base, subpinnately nerved, occasionally shallowly lobed with ciliate-serrate margins, 4.5–7 cm. long, 1.5–2 cm. wide, essentially glabrous on both surfaces, petioles 0.5–2 cm. long, glabrous, stipules persistent, lanceolate, up to 2 cm. long, entire, glabrous, acuminate. Peduncles axillary, 2–3 cm. long, glabrous. Cymes laxly few-flowered. Bracts persistent, lanceolate to ovate, subtire to ciliate-serrulate, 1–2 mm. long. Staminate pedicels very slender, to 6 mm. long. Staminate tepals 2, ovate to suborbicular, 2 mm. long and broad. Stamens free, few, anthers elliptic or ovate, the connective produced. Pistillate bracteoles persistent, obovate to orbicular, entire to ciliolate-serrulate to almost lacerate, about 3 mm. long. Pistillate pedicels to 5 mm. long. Pistillate tepals 5, elliptic to ovate, 2–3 mm. long. Styles 3, 2-parted with the stigmatic tissue forming a continuous linear spiral band, ovary 3-celled, placentae variable even in the same ovary. Capsule subelliptic to orbicular, glabrous, 6–14 mm. long, with subequal rounded wings, seeds stalked, oblong and obtuse, truncate at the base.

Mexico and Guiana to Peru.

BOCAS DEL TORO: Carleton 54; von Wedel 370; vicinity of Nievécita, alt. 0–50 m., Woodson, Allen & Seibert 1810; vicinity of Chiriquí Lagoon, von Wedel 1331; Changuinola Valley, Dunlap 167. CANAL ZONE: Chagres, Fendler 297.

16. *BEGONIA FILIPES* Benth. Bot. Voy. Sulph. 101. 1845.*Begonia hygrophila* C. DC. ex Th. Dur. & Pittier in Bull. Soc. Bot. Belg. 35<sup>1</sup>:265. 1896.*Begonia hygrophila* var. *puberula* C. DC. ex Th. Dur. & Pittier in Bull. Soc. Bot. Belg. 35<sup>1</sup>:266. 1896.*Begonia mameiana* C. DC. in Smithson. Misc. Coll. 69: no. 12:4. 1919.*Begonia leptopoda* C. DC. in Smithson. Misc. Coll. 69: no. 12:6. 1919.*Begonia chepoensis* C. DC. in Smithson. Misc. Coll. 69: no. 12:8. 1919.*Begonia heterodonta* Rusby, Descr. New Sp. S. Am. Pl. 66. 1926.

Herbaceous, 2–6 dm. high. Stem simple to slightly branched, glabrous, finely ridged. Leaves strongly asymmetric, semiovate to obliquely or transversely ovate, acuminate, mostly truncate at base, palmately nerved with the chief veins branching divaricately above and with the margins crenate-dentate and ciliate, 4–10 cm. long, 2–4 cm. wide, rather abundantly appressed-pilose above with long tapering hairs, essentially glabrous on lower surface, petiole 0.5–4 cm. long, glabrous, stipules mostly persistent, oblong-ovate, acute to acuminate to the setulose tip, 6–12 mm. long, 2–4 mm. wide, very thin, entire. Peduncles axillary, up to 5 cm. long, glabrous. Cymes few-flowered. Bracts persistent, ovate-acute with setulose tip,

up to 7 mm. long and 2 mm. wide. Pedicels glabrous, 4–10 mm. long. Staminate tepals 2, ovate, to 3.5 mm. long and 2 mm. wide. Stamens few, attached to a short column, connective slightly produced. Bracteoles obovate, serrate-ciliate, to 3.5 mm. long, more or less persistent. Pistillate tepals 4 or occasionally 5, ovate to orbicular, ca. 2 mm. long, slightly more than 1 mm. wide. Styles 3, 2-parted, with the papillate stigmatic surface forming spiral bands. Ovary 3-celled, placentae variable. Capsule glabrous, 4–6 mm. long, the largest wing mostly obtuse, to 1 cm. wide, the other two subequal, narrow, seeds stalked, oblong, obtuse, truncate at base.

Costa Rica and Panama to Colombia.

CANAL ZONE: Mamei, alt. 10–30 m., *Pittier 2251*; forest between Frijoles and Monte Lirio, alt. 30 m., *Killip 12143*; along small rivulet in forest, Gatún, *Ostenfeld 84*; Las Cascadas Plantation, near Summit, *Standley 25706, 25723, 29512*; Cerro Gordo, near Culebra, *Standley 26003*; hills west of the canal, near Gatún, *Standley 27222*; hills north of Frijoles, *Standley 27568*; Gamboa, *Standley 28406*; Río Paraíso, above East Paraíso, *Standley 29882*; vicinity of Fort Sherman, *Standley 30952*; Obispo, *Standley 31743*; Barro Colorado Island, Gatún Lake, *Standley 40909, 41020, Woodworth & Vestal 391*; drowned forest of Quebrada Culebra, alt. 70–75 m., *Dodge & Allen s. n.*; between Madden Dam and Saddle 11, near Alahuella, alt. 90–100 m., *Dodge, Steyermark & Allen 16504*; on tree, drowned forest along Río Chagres between junction with Río Pequéní and Río Indio, alt. 66 m., *Steyermark & Allen 16795*. CHIRIQUÍ: vicinity of San Félix, alt. 0–120 m., *Pittier 5215*. COLÓN: wooded swamp between France Field and Catival, *Standley 30194*. DARIÉN: vicinity of Pinogana, alt. 20 m., *Allen 937*. PANAMÁ: along Chavare River, near Chepo, alt. 50–200 m., *Pittier 4713*; rocky banks of Pacara River, *Killip 3156*; wet forest, Río Tapia, *Standley 26155, 28234*; Taboga Island, *Standley 27888*; moist forest, Río Tecumen, *Standley 29411*; San José Island, *Johnston 108*.

17. *BEGONIA FISCHERI* Schrank var. *TOVARENSIS* (Kl.) Irmscher, Bot. Jahrb. 76: 23. 1953.

*Begonia towarensis* Kl. in Abh. Akad. Berlin 1854:31. 1855.

*Begonia populifolia* sensu Liebm. in Kjoeb. Vidensk. Meddel. 1852:16. 1853, non HBK. 1825.

*Begonia moritziana* Kl. in Abh. Akad. Berlin 1854:31. 1855, non Kunth & Bouché, 1848.

*Begonia towarensis*  $\beta$  *ocanensis* A. DC. in DC. Prod. 15<sup>1</sup>:303. 1864.

*Begonia ciliibracteola* C. DC. in Smithson. Misc. Coll. 69: no. 12:5. 1919.

Herbaceous, 2–12 dm. high, sparsely brown-pilose to glabrous. Stem erect, red, branches short. Leaves more or less asymmetric, broadly ovate or suborbicular, acute or rounded, cordate at base, 2–9 cm. long, palminerved, crenate-serrate, ciliate, glabrous above, more or less brown-pilose beneath especially on the nerves, petioles 5–45 mm. long, stipules deciduous, ovate-oblong, to 10 mm. long, ciliate-serrulate. Peduncles axillary, 15–55 mm. long. Cymes bisexual, few-flowered. Bracts persistent, ovate, 2–4 mm. long, fimbriate. Pedicels 5–20 mm. long. Staminate tepals 4, the outer orbicular, 8 mm. long, the inner smaller, narrowly obovate. Stamens free, numerous, filaments short, anthers oblong, the connective produced, obtuse. Pistillate bracteoles like the bracts. Pistillate tepals 5, obovate, 3–6 mm. long. Styles 3, bifid, the stigmatic tissue linear, spiral, continuous, placentae bilamellate, ovuliferous throughout. Capsule 10–15 mm. long, its wings decurrent, very unequal, the largest typically ascending and tapering, often hooked, to 23 mm. wide, seeds fusiform.

Cuba, Mexico, Central America, Colombia, Venezuela, Peru, Bolivia.

CANAL ZONE: Ahorca Lagarto to Culebra, *Cowell* 388; on marshy or floating island, Barro Colorado Island, *Kenoyer* 460, *Bailey* 644, *Woodworth & Vestal* 696. COCLÉ: shaded margins of marsh near Río Antón, floor of El Valle de Antón, alt. 600 m., *Allen* 2777. PANAMÁ: on grassy jams in lake, vicinity of Arenoso, lower Río Trinidad, alt. 26–50 m., *Seibert* 617.

18. *BEGONIA OAXACANA* A. DC. in DC. Prod. 15<sup>1</sup>:312. 1864.

*Begonia oaxacana*  $\beta$  *pilosula* A. DC. in DC. Prod. 15<sup>1</sup>:312. 1864.

*Begonia luxii* C. DC. in Bot. Gaz. 20:541. 1895.

*Begonia serrulatoala* C. DC. in Bull. Herb. Boiss. II. 8:321. 1908.

*Begonia pubipedicella* C. DC. in Smithson. Misc. Coll. 69: no. 12:7. 1919.

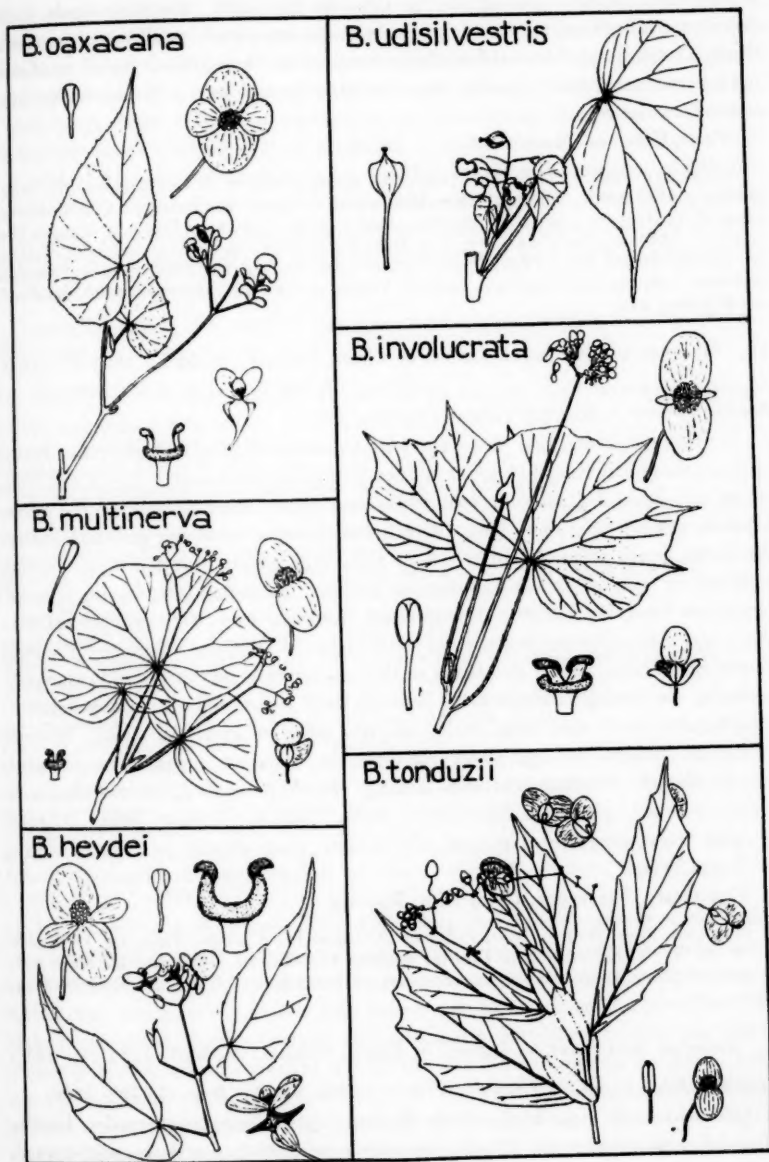
Herbaceous to suffruticose, terrestrial or epiphytic, suberect or climbing, very variable in all its parts, 3–15 dm. high. Stems 2–12 mm. thick, glabrous to pilose, green or red. Leaves transverse or oblique or rarely some almost straight, broadly or narrowly ovate, acuminate, palmately 5–7-nerved, cordate at base, slightly or usually not at all lobed, 6–18 cm. long, 3–11 cm. wide, serrulate, sparsely hirsute on both sides or nearly glabrous above, thin, petioles slender, 4–15 cm. long, sparsely hirsute to glabrous, stipules deciduous, oblong, 12 mm. long, setose-mucronate, entire. Peduncles axillary, 2–5 cm. long. Cymes few-flowered, bisexual. Bracts tardily deciduous, broadly ovate or suborbicular, obtuse, 6–12 mm. long, entire. Pedicels 10–15 mm. long. Staminate tepals 4, the outer suborbicular or broadly ovate, 10–15 mm. long, pink, glabrous or at times somewhat pubescent, the inner slightly shorter, obovate, white. Stamens free, numerous, the filaments longer than the obovoid anthers. Pistillate bracteoles wanting or quickly deciduous. Pistillate tepals 3, the outer two suborbicular, 8–14 mm. long, the inner one much smaller, narrowly obovate or oblong. Ovary 2–3-celled, placentae bifid, ovuliferous on all sides, styles 3, short-connate, bilobed, the stigmatic surface linear, spiral, continuous. Capsule erect, broadly elliptic, 10–15 mm. long, hirsute to glabrous, wings 3 or sometimes up to 6, subequal, narrow, angled at middle or somewhat above giving the fruit a rhombic or obovate outline, entire to fimbriate-serrulate, seeds ellipsoid, broadly obtuse, short-stalked.

Southern Mexico, Guatemala, Panama.

CHIRIQUÍ: humid forest of Cuesta de Las Palmas, southern slope of Cerro de la Horqueta, alt. 1700–2100 m., *Pittier* 3248; rain forest, Bajo Chorro, Boquete District, alt. 1800 m., *Davidson* 55; vicinity of Casita Alta, Volcán de Chiriquí, alt. 1500–2000 m., *Woodson, Allen & Seibert* 959; Bajo Mono, Robalo Trail, western slopes of Cerro Horqueta, alt. 1500–2100 m., *Allen* 4809.

19. *BEGONIA UDISILVESTRI* C. DC. in Smithson. Misc. Coll. 69: no. 12:9. 1919.

Herbaceous, 1 m. high, branching, completely glabrous except for a ring of trichomes at the apex of the petiole. Leaves transverse or oblique, ovate, cordate at base, long-acuminate, palminerved, to 11.5 cm. long, serrulate, petioles slender, to 11 cm. long, verruculose, stipules deciduous. Cymes few-flowered, regular, about equaling the leaves or shorter. Bracts deciduous, entire. Staminate tepals 4, entire, the outer suborbicular, 5 mm. long, the inner narrowly obovate, shorter.

Fig. 18. *Begonia*

Stamens free, anthers oblong, shorter than the filaments. Pistillate tepals 3, the outer two suborbicular, 5 mm. long, the inner one much smaller and narrower. Ovary 3-celled, placentae bilamellate, ovuliferous throughout, styles deciduous, connate at base, bifid. Capsule erect, ovoid, attenuate into a slender beak, wings equal, very narrow.

Costa Rica and Panama.

BOCAS DEL TORO: Robalo Trail, northern slopes of Cerro de la Horqueta, alt. 1800–2100 m., *Allen 4938*. CHIRIQUÍ: humid forest of Cuesta de Las Palmas, southern slope of Cerro de la Horqueta, alt. 1700–2100 m., *Pittier 3249*; Volcán de Chiriquí, Boquete District, alt. 2700 m., *Davidson 1025*; trail from Cerro Punta to headwaters of Río Caldera, alt. 2250–2500 m., *Allen 1440*; Casita Alta to Cerro Copete, alt. 2300–3300 m., *Woodson & Schery 349*; Portrero Muleto to summit, Volcán de Chiriquí, alt. 3500–4000 m., *Woodson & Schery 444*.

20. *BEGONIA INVOLUCRATA* Liebm. in Kjoeb. Vidensk. Meddell. 1852:15. 1853.

*Begonia broussonetiiifolia* A. DC. in Ann. Sci. Nat. IV. 11:133. 1859.

*Begonia laciniosa* A. DC. in DC. Prod. 15<sup>1</sup>:340. 1864.

Fruticose, 1–2 m. high. Stem fulvous-tomentose or becoming glabrous. Leaves oblique, cordate at base, 2–5-lobed at apex with acuminate points, 15–28 cm. wide, to 20 cm. high, denticulate, evenly pilosulous above, more densely on the nerves beneath, petioles 12–18 cm. long, fulvous-tomentose or becoming glabrous, stipules deciduous, ovate, setose-apiculate, 14–25 mm. long, entire, brown, membranaceous, glabrous or sparsely pilose. Peduncles axillary, exceeding the leaves, fulvous-tomentose becoming glabrous. Cymes many-flowered, dense, their primary branches short and their ultimate branches so nearly aborted that the inflorescence appears almost umbellate. Bracts deciduous, entire, the outer ovate, ample and completely enclosing the young inflorescence. Pedicels 5–25 mm. long. Staminate tepals 2, suborbicular, 6–11 mm. long, entire, sparsely pilose to glabrous, white. Stamens numerous, anthers oblong, about equaling the filaments, connective produced, broadly obtuse. Pistillate bracteoles lacking. Pistillate tepals 2, like the staminate. Ovary 3-celled, placentae bilamellate, styles connate at base, bifid. Capsule ellipsoid, very unequally 3-winged, the largest wing elliptic or falcate, obtuse, 8–10 mm. wide.

Guatemala, Nicaragua, Costa Rica, Panama.

CHIRIQUÍ: moist shaded places, valley of the upper Río Chiriquí Viejo, alt. 1300–1900 m., *White 34*; rain forest, Bajo Chorro, Boquete District, alt. 1800 m., *Davidson 108*; vicinity of "New Switzerland", central valley of Río Chiriquí Viejo, alt. 1800–2000 m., *Allen 1349*.

21. *BEGONIA MULTINERVIA* Liebm. in Kjoeb. Vidensk. Meddell. 1852:18. 1853.

*Begonia cuspidata* C. DC. ex Th. Dur. & Pittier in Bull. Soc. Bot. Belg. 35<sup>1</sup>:260. 1896.

Suffruticose, 2–3 m. high. Stem flexuous with elongate internodes, brown-pilose. Leaves transversely elliptic, abruptly acute, cordate at base, palminerved, 12–22 cm. long, entire, glabrous, petioles divergent, 6–16 cm. long, brown-pilose, stipules deciduous, lance-oblong or narrowly triangular, setose-acute, 2–3 cm. long,

entire, membranaceous. Peduncles axillary, 15–38 cm. long, exceeding the leaves, sulcate, soon glabrous. Cymes bisexual, regularly dichotomous, 12–25 cm. broad, glabrous. Bracts deciduous, suborbicular, entire, the lowest 17 mm. long. Pedicels 7–15 mm. long. Flowers white. Staminate tepals 2, broadly ovate or suborbicular, 8 mm. long, entire. Stamens numerous, anthers obovoid, shorter than the filaments, connective scarcely if at all produced. Pistillate bracteoles lacking. Pistillate tepals 2, like the staminate. Ovary 3-celled, placentae bilamellate, ovuliferous throughout, styles much connate at base, bifid, the stigmatic tissue linear, spiral, continuous. Capsule subglobose, 7 mm. long, wings very unequal, the largest ovate or elliptic, to 14 mm. wide, the others narrowly lunate, seeds stalked, ellipsoid.

Costa Rica, Panama.

CHIRIQUÍ: between Hato del Jobo and Cerro Vaca, eastern Chiriquí, alt. 700–1000 m., Pittier 5420.

22. *BEGONIA URTICAE* L. f. Suppl. 420. 1781.

*Begonia urticifolia* J. E. Smith, Pl. Icon. Ined. 2: pl. 45. 1790, pro errore.

*Begonia columnaris* Benth. Pl. Hartweg. 131. 1844.

*Begonia trachyptera* Benth. Pl. Hartweg. 184. 1845.

*Stiradotoca trachyptera* Kl. in Monatsber. Akad. Berlin 127. 1854.

*Begonia coccinea* Ruiz ex Kl. in Monatsber. Akad. Berlin 127. 1854, e. p., nomen in synon.

*Sasaea urticae* Kl. in Monatsber. Akad. Berlin 128. 1854.

*Sasaea columnaris* Kl. in Monatsber. Akad. Berlin 128. 1854.

*Begonia glabra* Ruiz ex Kl. in Monatsber. Akad. Berlin 128. 1854, nomen in synon.

*Casparya coccinea* Kl. in Abh. Akad. Berlin 1854:128. 1855.

*Stibadotoca trachyptera* Kl. in Abh. Akad. Berlin 1854:131. 1855.

*Sasaea glabra* Kl. in Abh. Akad. Berlin 1854:134. 1855.

*Begonia cucullata* Ruiz ex Kl. in Abh. Akad. Berlin 1854:134. 1855, nomen in synon.

*Casparya trachyptera* A. DC. in DC. Prod. 15<sup>1</sup>:274. 1864.

*Casparya columnaris* A. DC. in DC. Prod. 15<sup>1</sup>:274. 1864, non Kl. 1854.

*Casparya columnaris*  $\beta$  *glabra* A. DC. in DC. Prod. 15<sup>1</sup>:274. 1864.

*Casparya urticae* A. DC. in DC. Prod. 15<sup>1</sup>:274. 1864.

*Casparya urticae*  $\beta$  *hispida* A. DC. in DC. Prod. 15<sup>1</sup>:274. 1864.

*Sasaea hoffmanniana* Kl. ex A. DC. in DC. Prod. 15<sup>1</sup>:275. 1864, nomen in synon.

*Begonia monticola* C. DC. in Bull. Herb. Boiss. II. 8:325. 1908.

*Begonia torresii* Standl. in Journ. Wash. Acad. Sci. 17:313. 1927.

*Begonia chiriquensis* Standl. in Woodson & Schery in Ann. Mo. Bot. Gard. 27:321. 1940.

*Begonia columnaris* var. *glabra* Smith & Schubert in Macbride, Fl. Peru, in Field Mus. Pub. Bot. 13<sup>4</sup>:187. 1941.

Herbaceous to suffruticose. Stem branching, decumbent, rooting at the nodes, 15–40 cm. high or rarely to 2 m., the younger parts usually ferruginous-puberulent. Leaves straight or nearly so, strongly asymmetric, ovate or elliptic, acute or acuminate, base acute on the adaxial side, obtuse and decurrent on the other, 3–8 cm. long, penninerved, doubly serrate, ciliate, sparsely hirtellous to glabrous above, densely pubescent on the nerves to wholly glabrous beneath, petiole 2–15 mm. long, stipules deciduous, ovate, obtuse, setose, 2–6 (rarely to 12) mm. long. Peduncles axillary, erect, 12–45 mm. long, 1- to few-flowered. Bracts deciduous, elliptic, setaceous-dentate at apex. Pedicels 6–18 mm. long. Staminate tepals 4, subequal, 3–8 mm. long, the outer elliptic, entire, red, often pilose, the inner obovate, white. Stamens on a slender column 2 mm. high, filaments short, anthers linear, the con-



nective slightly produced. Pistillate bracteoles deciduous, elliptic. Pistillate tepals 5, subequal, elliptic, 3–5 mm. long, entire, red or white, the outer often pilose. Styles 3 with many short branches wholly covered by stigmatic papillae, placentae bilamellate, ovuliferous on all sides. Capsule very variable, broadly turbinate, obtuse at base, with 3 ascending horns on the angles, the tips of the horns often deciduous, the apical column well developed, angled or terete, slender, conical or cylindrical or subclavate, from longer than the horns to rarely shorter.

Costa Rica to Peru.

BOCAS DEL TORO: along streams, Robalo Trail, northern slopes of Cerro de la Horqueta, alt. 1800–2100 m., *Allen 4980*. CHIRIQUI: rain forest, Bajo Chorro, Boquete District, alt. 1800 m., *Davidson 107*; epiphytic, trail from Cerro Punta to headwaters of Río Caldera, alt. 2250–2500 m., *Allen 1435*; vicinity of Cerro Punta, alt. 2000 m., *Allen 3484*.

23. *BEGONIA HEYDEI* C. DC. in Bot. Gaz. 20:540. 1895.

*Begonia pittieri* C. DC. in Bull. Herb. Boiss. II. 8:316. 1908.

*Begonia triloba* C. DC. in Bull. Herb. Boiss. II. 8:322. 1908.

Erect, to 6 dm. high, branching with elongate internodes, glabrous. Leaves oblique, cordate at base, narrowly ovate, acuminate, penninerved, 6–10 cm. long, 2–3.5 cm. wide, remotely denticulate, petioles 10–34 mm. long, stipules deciduous, lance-ovate, subulate, 5 mm. long. Peduncles axillary, 15–28 mm. long. Cymes few-flowered, exceeded by the leaves. Bracts deciduous. Pedicels 8–10 mm. long. Staminate tepals 4, entire, obtuse, the outer ovate or elliptic, 7 mm. long, setose toward base, the inner slightly shorter. Stamens many on a short column, anthers obovate, nearly equaling the filaments. Pistillate bracteoles elliptic, entire, about equaling the ovary. Pistillate tepals 3, elliptic or obovate, entire, setose toward base. Ovary 3-celled, placentae simple, styles deciduous, connate at base, bifid. Capsule rhomboidal, attenuate at base, bearing three equal slender acuminate horns 9–11 mm. long.

Guatemala, Costa Rica, Panama.

COCLÉ: epiphytic, vicinity of El Valle de Antón, alt. 600 m., *Allen 2078*; epiphytic, La Mesa, *Allen 2722*.

24. *BEGONIA TONDUZII* C. DC. in Bull. Soc. Bot. Belg. 35<sup>1</sup>:264. 1896.

*Begonia allenii* Standl. in Woodson & Seibert in Ann. Mo. Bot. Gard. 25:830. 1938.

Cauliscent, 28–48 cm. high. Stem erect, simple or rarely few-branched, woody at least toward base, rufous-pilose becoming glabrous with age, internodes mostly short but distinct. Leaves nearly straight, strongly asymmetric, oblanceolate, penninerved, acuminate, cuneate, falcate, 6–12 cm. long, 2–5 cm. wide, coarsely sinuate-dentate near apex, glabrous or pilose on the midnerve beneath, petioles 5–9 mm. long, pilose to glabrous, stipules more or less persistent, broadly ovate, setose-acuminate, 10–25 mm. long, entire, thin. Peduncles few, axillary, 3–7 cm. long. Cymes few-flowered, regular, rather dense, pilose at first. Bracts persistent, small, suborbicular, serrate. Pedicels 5–16 mm. long. Flowers pink or red. Staminate tepals 2, broadly ovate, 5–8 mm. long, more or less pubescent. Stamens free,



anthers oblong, about as long as the filaments, connective produced, obtuse. Pistillate bracteoles like the bracts. Pistillate tepals 5, equal. Ovary 3-celled, placentae bilamellate, ovuliferous throughout, styles connate at base, stigmatic tissue linear, spiral, continuous. Capsule erect, subglobose, wings subequal, very variable in width.

Costa Rica, Panama.

COCLÉ: El Valle de Antón, along Río Indio trail, alt. 500-700 m., *Hunter & Allen* 327; north rim, vicinity of El Valle, *Allen* 234, 1663; banks along trail to La Mesa, hills north of El Valle de Antón, alt. 800-1000 m., *Allen* 2286; Cerro Pajita, hills north of El Valle de Antón, alt. 1000-1200 m., *Allen* 4174.

25. *BEGONIA OPULIFLORA* Putz. in *Fl. des Serres* I. 10: pl. 995. 1854-55.

Suffrutescent, branching, over 1 m. high, glabrous. Leaves straight, strongly asymmetric, ovate or elliptic, acute, 8-9 cm. long, rounded at base, pinnate, subulate-dentate, petioles much shorter than the blades, stipules oblong-cordate,



Fig. 19. *Begonia opuliflora*

long-aristate, membranaceous. Peduncles axillary, about 15 cm. long. Inflorescences umbelliform, globose, 50–60-flowered. Pedicels elongate. Flowers white. Staminate tepals 4, subequal, broadly elliptic, obtuse, entire. Stamens about 30, slightly connate at base, anthers oblong. Pistillate tepals 5, oblong or lance-oblong, subacuminate. Styles 3, connate, stigmatic tissue lunate. Fruit 3-winged, the wings very unequal, the largest much wider than high, twice the width of the others.

Endemic

COCLÉ: Described from cultivation from the former Province of Soto which centered on Penonomé.

26. *BEGONIA GUADUENSIS* HBK. Nov. Gen. & Sp. 7:178. 1825.

*Begonia ottonis* Walpers, Repert. Bot. Syst. 2:212. 1843.

*Begonia walpersii* Heynh. Nom. 2:63. 1846.

*Donaldia ottonis* Kl. in Monatsber. Akad. Berlin 127. 1854, nomen.

*Begonia laurina* Hort. ex A. DC. in DC. Prod. 15<sup>1</sup>:292. 1864, nomen in synon.

*Begonia serratifolia* C. DC. in Smithson. Misc. Coll. 69: no. 12:7. 1919.

Suffruticose, scandent to 2 m. high, glabrous. Stem erect, branched. Leaves straight, asymmetric, pinnate-nerved, lanceolate to elliptic-lanceolate, acute or acuminate, unequal at base with the adaxial side cuneate and the other rounded and decurrent, 5–9 cm. long, 16–40 mm. wide, doubly crenate-serrate, ciliate, membranaceous, petiole 2–8 mm. long, stipules deciduous or subsistent, oblong-ovate, acuminate-setiferous, 8–10 mm. long, scarious. Peduncles terminal and axillary, 4–5 cm. long. Cymes dichotomous, few- to many-flowered, 6–15 cm. in diameter. Bracts deciduous or subsistent, ovate, obtuse, acute or mucronate, 4–7 mm. long, scarious. Pedicels 4–19 mm. long. Flowers pinkish white. Staminate tepals 4, the outer elliptic-ovate, entire or dentate at apex, 8–15 mm. long, the inner obovate, distinctly shorter. Stamens free, very numerous, anthers oblong, mostly shorter than the filaments, connective produced, apiculate or obtuse. Pistillate bracteoles deciduous, ovate to narrowly obovate, 6 mm. long, entire. Pistillate tepals 5, subequal with the two outer slightly smaller, elliptic, acute, 6–10 mm. long. Styles 3, bifid nearly to base, each main branch with 3–4 short spiral branches, placentae bifid, ovuliferous throughout. Capsule ellipsoid, the largest wing triangular, horizontal or slightly ascending, 15 mm. wide, the other two marginiform.

Panama, Colombia, Venezuela.

CANAL ZONE: side cuts, railroad relocation between Gorgonas and Gatún, alt. 10–50 m., Pittier 2258; drowned forest of Quebrada Culebra, alt. 70–75 m., Dodge & Allen; westerly arm of Quebrada Salamanca, alt. 70 m., Dodge, Steyermark & Allen; near Madden Dam at Alahuela, alt. 70 m., Dodge, Steyermark & Allen 16822; forest along telephone trail between the Río Indio Hydrographic Station and the Natural Bridge of the Río Puente, Dodge & Allen 17481; drowned forest of Quebrada Ancha, alt. 70 m., Dodge & Steyermark. CHIRIQUÍ: vicinity of San Félix, eastern Chiriquí, alt. 0–120 m., Pittier 5126. VERAGUAS: hills west of Soná, alt. 500 m., Allen 1034.

27. *BEGONIA ESTRELLENSIS* C. DC. in Bot. Gaz. 20:540. 1895.

Woody vine. Stem elongate, glabrous. Leaves pinnately veined, ovate-elliptic,

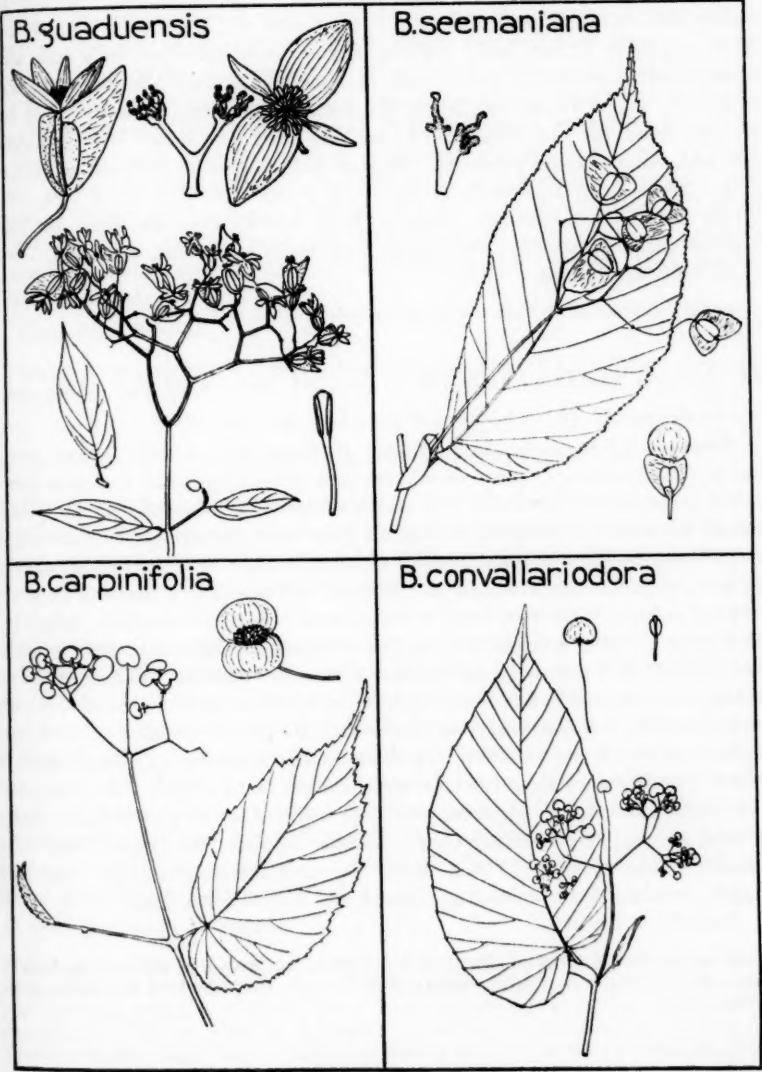


Fig. 20. *Begonia*

rather abruptly narrowed to a slender acumination (to 1 cm. long), acute to cuneate at base with the broader half produced 1 mm. beyond the narrower, remotely denticulate, glabrous, foveolate, 5-6.5 (-9.5) cm. long, 1.7-2.3 (-3.3) cm. wide, petioles to 12 mm. long, glabrous, stipules early deciduous, only scars seen. Inflorescences pedunculate and cymose, terminal and axillary. Staminate pedicels to 18 mm. long. Tepals regularly 4, the outer ovate, obtuse, to 6 mm. long and 5.5 mm. broad, the inner elliptic, to 5 mm. long and 2 mm. wide. Stamens numerous, free, the connective produced. Pistillate pedicels slender, glabrous, to 20 mm. long. Tepals 2, ovate, broadly acute, to 10 (-16) mm. long and 8 mm. wide. Ovary glabrous, punctulate. Styles 3, bifid, broadly expanded above the base. Capsule unequally tri-alate, the largest wing to 10 mm. wide, ascending, acute.

Costa Rica, Panama.

COCLÉ: vicinity of El Valle, north rim, alt. 800-1000 m., *Allen 220*.

28. *BEGONIA SEEMANNIANA* A. DC. in Ann. Sci. Nat. IV. 11:133. 1859.

*Begonia chiriquina* C. DC. in Smithson. Misc. Coll. 69: no. 12:8. 1919.

Shrub to 3.5 m. high. Stem slender, glabrous, finely ribbed. Leaves asymmetric, elliptic-obovate, penninerved, serrulate-denticulate with setiferous teeth, acuminate, unequally obtuse at base with the broader side extended on the petiole beyond the narrower, glabrous to minutely puberulent throughout, foveolate, 9.5-14 cm. long, 4.5-6 cm. wide, petioles glabrous, rugose, 5-15 mm. long, stipules glabrous, ovate to elliptic, obtuse to acuminate and mucronate, truncate to nearly clasping at base, 15-25 mm. long, 4-6 mm. wide. Peduncles to 7 cm. long. Inflorescences cymose, terminal and axillary. Bracts inconspicuous, the staminate thin, elliptic, ca. 1 mm. long, the pistillate very early deciduous. Pedicels glabrous, slender, to 2 cm. long. Staminate tepals 2, ovate-obtuse to semi-orbicular, usually cordate at base, 5-6 mm. long, 3-8 mm. wide. Stamens numerous, free, with connectives produced and exceeding the shorter outer filaments. Pistillate tepals 2 (rarely a smaller third one present), obovate and obtuse to elliptic, 5-8.5 mm. long, 3-5.5 mm. wide. Ovary glabrous, sometimes with reddish dots on surface. Styles 3, bifid or irregular, essentially free. Capsule tri-alate, the largest wing with truncate obtuse apex, to 15 mm. wide, one wing marginiform, the third only slightly broader. Seeds obovoid or ellipsoid, less than 0.5 mm. long.

Costa Rica, Panama.

CHIRIQUÍ: humid forest of Cuesta de Las Palmas, southern slope of Cerro de la Horqueta, alt. 1700-2100 m., *Pittier*; vicinity of El Boquete, alt. 1000-1300 m., *Maxon 4948*; *Pittier 3152*.

29. *BEGONIA CARPINIFOLIA* Liebm. in Kjoeb. Vidensk. Meddel. 1852:20. 1853.

Herbaceous, suffrutescent or subscandent. Stem glabrous, green to reddish, finely ridged. Leaves obliquely ovate-acuminate to obliquely elliptic, obliquely obtuse at base with the broader half produced 1 mm. or more beyond the narrower,

glabrous, foveolate and prominently veined beneath, prominently serrate-denticulate with setiferous teeth, 5-7.5 (-11) cm. long, 2.5-3.7 (-4.7) cm. wide, petioles 3.5-10 mm. long, glabrous, stipules persistent, pinkish to greenish when fresh, linear to lanceolate or narrowly ovate with oblique base and acute apex, 7-13 mm. long, ca. 5 mm. wide. Inflorescences pedunculate, cymose, axillary and terminal. Bracts of the peduncles similar to the stipules, secondary bracts and bracteoles obovate to orbicular, obtuse to truncate. Pedicels glabrous, slender, to 1 cm. long in fruit. Staminate tepals 2, orbicular, cordate at base, 5-8 mm. long, 6-7 mm. wide. Stamens numerous, free, filaments of the outer ones shorter, connective produced. Pistillate tepals 2, chiefly orbicular, 3-6 mm. long, 4.5-5 mm. wide. Styles 3, short-connate. Capsule ca. 6 mm. high, its largest wing ascending, acute to obtuse, ca. 5 mm. wide, the other two marginiform and subequal. Seeds minute, slenderly obovoid.

Costa Rica, Panama.

CHIRIQUÍ: vicinity of "New Switzerland", central valley of Río Chiriquí Viejo, alt. 1800-2000 m., *Allen 1408*.

30. *BEGONIA CONVALLARIODORA* C. DC. in Bot. Gaz. 20:538. 1895.

Herbaceous, 1-15 m., scandent to erect. Stem slender, little branched, ribbed and glabrous, the internodes of the main axis 5.5-14 cm. long. Leaves pinnately veined, asymmetric, somewhat denticulate, obliquely elliptic, abruptly acuminate, the broader half usually produced into a conspicuous lobe at base, 8.5-15 cm. long, 4-7.5 cm. wide, petioles 12-40 mm. long, stipules membranaceous, obliquely elliptic, entire, acute and apiculate, truncate at base, 25 mm. long, 7 mm. wide. Peduncles 3-8 cm. long. Cymes regular, multi-flowered. Bracts early deciduous. Pedicels 6-16 mm. long. Tepals entire, white or pinkish, the staminate 2 (rarely 3 or 4), orbicular, cordate at base, 4-8 mm. long, the inner, when present, elliptic, 1-3.5 mm. long. Stamens numerous, anthers oblong-elliptic, usually equal to or longer than the filaments, connective produced, obtuse. Pistillate bracteoles soon deciduous, entire, elliptic, obtuse. Pistillate tepals 2 (rarely 3), orbicular to rounded-ovate, 6-9 mm. long, the third, when present, smaller. Styles 3, bifid. Placentae bilamellate, ovuliferous throughout. Capsule ellipsoid, 3-winged, the largest wing obtuse, 7-12 mm. broad.

Southern Mexico to Panama.

CHIRIQUÍ: valley of the upper Río Chiriquí Viejo, vicinity of Monte Lirio, alt. 1300-1900 m., *Seibert 207*; Bajo Mona, mouth of Quebrada Chiquero, along Río Caldera, alt. 1500-2000 m., *Woodson, Allen & Seibert 1015*; vicinity of Bajo Mona and Quebrada Chiquero, alt. 1500 m., *Woodson & Schery 533*; vicinity of Bajo Chorro, alt. 1900 m., *Woodson & Schery 647*. COCLÉ: epiphytic, vicinity of El Valle, alt. 600-1000 m., *Allen 1188, 1207*.

## CACTACEAE

More or less massive and succulent, usually leafless terrestrial or epiphytic plants. Stems usually (except in *Pereskia*) phylloid and jointed, the joints elongate to suborbicular, terete to angled or flattened, the nodes with axillary areas (areoles) usually armed with spines, slender barbs (glochids) or hairs in various numbers and combinations, occasionally naked. Leaves alternate and laminate in *Pereskia*, but in the other genera minute and fugacious, or wholly lacking. Flowers pedunculate and in 1- to several-flowered panicles in *Pereskia*, in the other genera solitary and sessile, very large to very small, frequently nocturnal, epigynous (perigynous in *Pereskia*); perianth salverform or infundibuliform to rotate, with or without a conspicuous tube, monochlamydeous, actinomorphic when erect and more or less zygomorphic by position when horizontal or pendulous, the segments petaloid, usually white to red or yellow, relatively few to exceedingly numerous, the inner broader and more petaloid than the outer and lower, the tube naked or with bracts or areoles or both; stamens usually very numerous, with elongate filaments, inserted within the perianth tube or upon the ovary in rotate flowers; ovary inferior (sub-inferior in *Pereskia*), 1-celled, with few to several parietal placentas usually bearing numerous ovules, the style more or less elongate and filiform, with an elaborate radiate terminal stigma. Fruit a berry usually with numerous seeds immersed in succulent pulp.

The Cactaceae are a typically Western Hemisphere family, with only the genus *Rhipsalis*, the Mistletoe Cactus, doubtfully indigenous to the Old World. Species of *Opuntia*, however, especially *O. ficus-indica*, have been introduced since very early times and become naturalized in Africa and elsewhere. The genera vary in number according to the interpretation of individual authors, from only 20 (K. Schumann, in Engl. Nat. Pflanzenfam. III: 6. 1894) to over 100 (cf. Britton & Rose, in Carnegie Inst. Publ. No. 248. 1919-1923).

Much criticism has been made of the numerous segregate genera proposed by Britton and Rose and much undoubtedly remains to be learned of their natural relationships. In Panama, however, their genera usually are quite readily distinguishable into apparently natural groups; consequently they are adopted here without major modification. The controversy of "lumpers vs. splitters" in dealing with cacti dates at least as early as 1813, when Sims (in Curtis's Botanical Magazine 38: sub pl. 1557) inveighed against Haworth's generic segregates and advocated the return of both *Cereus* and *Opuntia* to the Linnaean genus *Cactus*, now long abandoned.

In humid Panama the cacti bear little resemblance as a rule to those so familiar in the landscapes of the arid regions of the United States and Mexico. Here they are mostly clambering semilianes on rocks, or epiphytes, with only two or three species of *Opuntia* and *Nopalea*, possibly introductions, to represent the Prickly Pears. *Pereskia* scarcely resembles a cactus at all, with its shrubby or tree-like habit, terete stems, and conspicuous leaves. Cacti of the *Rhipsalis* and *Cereus* alliances



often are encountered in Panama, but all to frequently in a sterile condition. This, together with the difficulty of preparing such succulent plants for the herbarium, accounts largely for the very few specimens found in museums. Actually, the species are not at all as rare as the few citations would indicate. The total number in Panama must be considerably greater than that of the present account.

- |   |                  |
|---|------------------|
| a. Stems not phylloid; leaves conspicuous and laminate, deciduous; flowers pedunculate, often clustered, perigynous.....  | 1. PERESKIA      |
| aa. Stems phylloid; leaves lacking or inconspicuous and fugacious; flowers sessile, solitary, epigynous.  |                  |
| b. Stem joints suborbicular to broadly linguiform in our species, entire, the areoles amphigenous, with glochids; perianth rotate to campanulate.   |                  |
| c. Petals erect, shorter than the stamens; stamen filaments not sensitive, erect at anthesis; style enlarged near the base into a disciform stylopodium. ....   | 2. NOPALEA       |
| cc. Petals spreading, longer than the stamens; stamen filaments sensitive, spreading at anthesis and inflexing upon stimulation; style only slightly thickened toward the base.....   | 3. OPUNTIA       |
| bb. Stem joints elongate, terete to angled, or flattened and undulate or lobed, the areoles marginal upon the flowering joints, without glochids.   |                  |
| c. Flowers very large, rarely mediocre, with a definite perianth tube; stamens adnate to the perianth tube.   |                  |
| d. Flowering stem joints ribbed or angled, the areoles usually more or less spiny and bristly.  |                  |
| e. Stem joints usually 5-angled, with numerous large spines; plants terrestrial, the stems erect at first, but finally deflexed and rooting at the tips; perianth tube much longer than the segments, the adnate bracts inconspicuous and fugacious but with prominent spiny areoles..... | 4. ACANTHOCEREUS |
| ee. Stem joints usually 3-angled, with inconspicuous and infrequent spines, or unarmed; plants clambering upon rocks or epiphytic, rooting laterally from the stem joints; perianth tube shorter than the segments.   |                  |
| f. Flowers very large; perianth tube with conspicuous and persistent bracts, not bristly or hairy.....  | 5. HYLOCEREUS    |
| ff. Flowers mediocre; perianth tube with inconspicuous and fugacious bracts subtending conspicuous persistent bristly or hairy areoles.....   | 6. WEBEROCEREUS  |
| dd. Flowering stem joints flat and leaflike, lobed or undulate, the areoles naked to minutely puberulent.   |                  |
| e. Flowers large, with an elongate perianth tube, the segments very numerous; stamens very numerous, the filaments many times longer than the anthers; stigma lobes numerous.....   | 7. EPIPHYLLUM    |
| ee. Flowers mediocre or relatively small, with a rather short perianth tube, the segments about 10-20; stamens about 20-30, the filaments not greatly longer than the anthers; stigma lobes 3-5.....  | 8. WITTIA        |
| cc. Flowers very small, without a definite perianth tube or the segments quite free; stamens adnate (in our species) to the margin of the hypanthium; flowering stem joints terete or essentially so, naked or with bristly or hairy areoles.....   | 8. RHIPSALIS     |

### 1. PERESKIA Mill.

PERESKIA Mill. Gard. Dict. ed. 4. 1754; Britton & Rose, in Carnegie Inst. Wash. Publ. no. 248. 1:8. 1919.

*Carpophyllus* Neck. Elem. Bot. 2:84. 1790, as *Carpophyllus*.

*Peireskia* Mill. acc. to Steud. Nom. ed. 2. 2:282. 1841, var. typogr.

Leafy trees or shrubs, sometimes clambering; stems terete, branching, succulent above, woody below, armed with stout spines in minutely pubescent axillary areoles. Leaves alternate, spiral, broadly laminate, deciduous. Flowers pedunculate, paniculate or solitary, both terminal and axillary; perianth rotate, with many free or slightly united segments, the outer somewhat shorter and less petaloid than the inner; stamens numerous, inserted in a shallow tube adnate to the base of the perianth. Ovary subinferior. Fruit a fleshy relatively few-seeded berry bearing the marcescent remains of the perianth.

A genus of about a dozen species, ranging from Mexico and Florida to Argentina and in the Antilles. Very widely cultivated in the tropics and subtropics of the world and in greenhouses, and used as an under stock of grafted *Zygocacti* and *Schlumbergeras*. The plants far more resemble the northern Osage Orange in habit than a true cactus.

- |   |                       |
|---|-----------------------|
| a. Clambering lianas; spines short and reflexed; berries globose, relatively small.....           | 1. <i>P. ACULEATA</i> |
| aa. Shrubs or small trees; spines elongate and straight; berries turbinate, relatively large..... | 2. <i>P. BLEO</i>     |

1. *PERESKIA ACULEATA* Mill. Gard. Dict. ed. 8. 1768.

*Cactus pereskia* L. Sp. Pl. 469. 1753.

*Cactus lucidus* Salisb. Prodr. 349. 1796.

*Pereskia longispina* Haw. Syn. Pl. Succ. 178. 1812.

*Pereskia aculeata*  $\beta$  *longispina* (Haw.) DC. Prodr. 3:475. 1828.

*Pereskia fragrans* Lem. Hort. Univ. 2:40. 1841.

*Pereskia undulata* Lem. Illustr. Hort. 5: Misc. 11. 1858.

*Pereskia pereskia* (L.) Karst. Deutsch. Fl. 888. 1882; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 1:10. 1919.

*Peireskia foetens* Spegg. in Weingart, Monatsschr. Kakteenk. 14:134. 1904.

*Pereskia godseffiana* Hort. Sand. in Gard. Chron. III. 43:257. 1908.

Clambering shrubs or lianas; branches terete, relatively slender, about 3–10 m. long, with pairs of stout reflexed spines 2–5 mm. long. Leaves shortly petiolate, the blade variable, usually elliptic to obovate, obtuse to acuminate, the base obtuse to cuneate, 3–8 cm. long, 1.5–4.0 cm. broad, the petiole 3–5 mm. long. Flowers usually few or several in terminal or axillary panicles about twice as long as the subtending leaves; pedicels about 0.5–1.5 cm. long, accrescent in fruit; perianth white, yellowish, or pink, rotate, about 3–5 cm. in diameter, the segments rather numerous, the inner obovate-oblong, the outer oblong-linear; stamens numerous, less than half as long as the perianth segments; style rather stout, slightly longer than the stamens. Berry globose, 1.5–2.0 cm. in diameter, with inconspicuous thornless areoles, yellow or orange when ripe.

Antilles; Panama and Colombia; also reported from southern Florida and Mexico, perhaps as an escape. Frequently cultivated. In the British West Indies the fruits, known as Barbados Gooseberries, are eaten and made into preserves.

PANAMÁ: Cerro Campana, alt. 800 m., Allen 3972.



Fig. 21. *Pereskia aculeata*

2. *PERESKIA BLEO* (HBK.) DC. Prodr. 3:475. 1828; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 1:17. 1919.

*Cactus bleo* HBK. Nov. Gen. & Sp. 6:69. 1823.

*Pereskia panamensis* Weber, in Bois, Dict. Hort. 739. 1898.

Shrubs or small trees to 4-7 m. tall; branches terete, rather stout, armed with few to several slender straight spines usually about 1 cm. long. Leaves rather long-petiolate, the blade usually elliptic-obovate, acuminate, cuneate, 4-20 cm. long, 2-7 cm. broad, the petiole 0.5-3.5 cm. long. Flowers usually few or solitary in terminal or axillary panicles shorter than the subtending leaves; pedicels about 5 mm. long; perianth pink to deep red, rotate, about 5-7 cm. in diameter, the segments rather numerous, the inner broadly obovate, the outer oblong-linear; stamens numerous, about half as long as the perianth segments; style rather stout, slightly longer than the stamens. Berry turbinate, 5-6 cm. long and broad, with several more or less persistent bracts, yellow when ripe.

Panama and northwestern South America. In Panama the plants are known as *ñajú de culebra* and *ñajú de espinas*. Britton and Rose found that the plants widely cultivated as *P. bleo* actually should be referred to *P. grandifolia* Haw., a native of Brazil.

DARIÉN: trail between Pinogano and Yavisa, Allen 281; Marraganti, Williams 661; Cana, Pittier 1884. PANAMÁ: Chepo, Pittier 4704. SAN BLAS: Caledonia Harbor, Elmore L34.

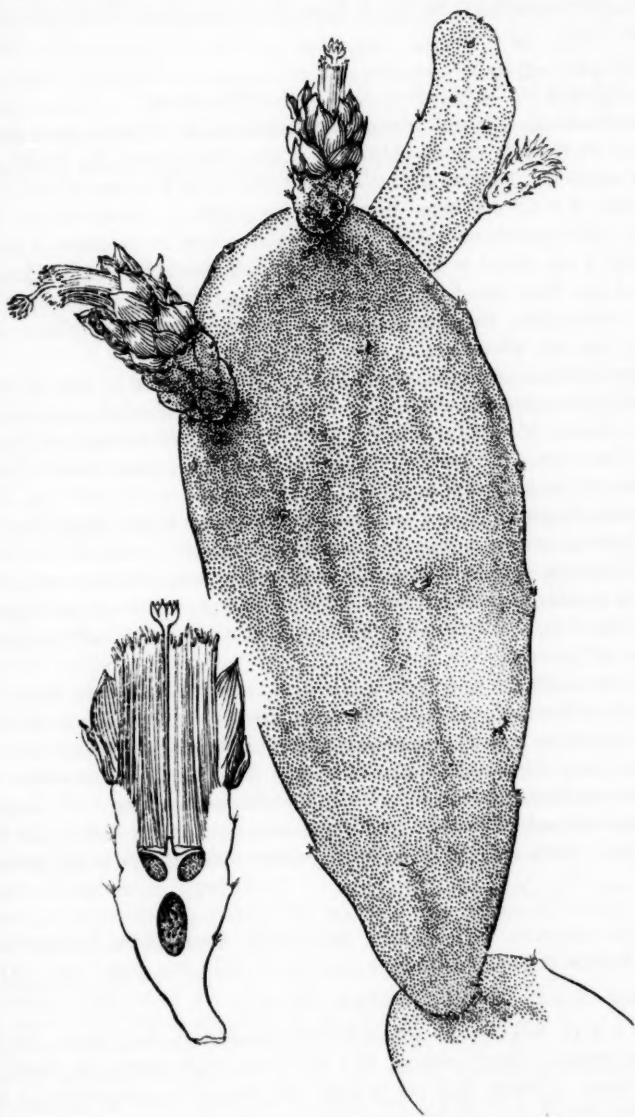
## 2. NOPALEA Salm-Dyck

NOPALEA Salm-Dyck, Cact. Hort. Dyck. 1849:63. 1850; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 1:33. 1919.

Massive succulent shrubs; stems phylloid and jointed when young, the joints fleshy, compressed, oval to oblong-elliptic, bearing amphigenous and rather sparse areoles armed with hairs and glochids and usually 1 to few stout spines, stoutly cylindric when older. Leaves inconspicuous, acicular, fugacious. Flowers sessile, solitary, chiefly marginal upon the young stem joints; perianth shortly campanulate, with a short and broad hypanthium, the segments rather few, the outer somewhat shorter and less petaloid than the inner, erect or very slightly spreading; stamens very numerous, the filaments much longer than the perianth, united in graded series at the base of the hypanthium in a shallow, glandular-dentate cup; ovary broadly turbinate, deeply concave, more or less tuberculate, the areoles very prominent; style longer than the stamens, enlarged shortly above the base into a conspicuous disciform stylopodium. Fruit a fleshy berry with numerous seeds.

About a dozen species of the Antilles and Central America. The two species of Panama, if they are species indeed, both appear to have been introduced, although Britton and Rose considered *N. dejecta* as "perhaps native in Panama."

- |  |                             |
|--|-----------------------------|
| a. Areoles without spines or nearly so; ovary and berries prominently tuberculate..... | 1. <i>N. COCHENILLIFERA</i> |
| aa. Areoles with 2-8 stout spines; ovary and berries scarcely tuberculate.....         | 2. <i>N. DEJECTA</i>        |

Fig. 22. *Nopalea cochenillifera*

1. *NOPALEA COCHENILLIFERA* (L.) Salm Dyck, Cact. Hort. Dyck. 1849:64. 1850, as *coccinellifera*; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 1:34. 1919.

*Cactus cochenillifer* L. Sp. Pl. 468. 1753.

*Opuntia cochinelifera* (L.) Mill. Gard. Dict. ed. 8. 1768, sphalm.

Stout shrubs to 4 m. tall, the older trunks broadly cylindric, to 2 dm. thick, the young stem joints elliptic-oblong, to 5 dm. long, green, the areoles without spines or nearly so. Flowers pink to deep red, the perianth segments erect or nearly so, the outer 0.5–1.5 cm. long, deltoid, the inner broadly oblong-obovate, 1.5–2.5 cm. long, the hypanthium naked, broadly campanulate or urceolate, 1.0–1.5 cm. long, about 1 cm. broad at the orifice; staminal filaments 2.5–3.5 cm. long, pink; ovary 2–3 cm. long, about 1.5 cm. broad, oblong-turbinate, truncate and deeply concave, tuberculate, the areoles unarmed. Berry oblongoid-turbinate, about 5 cm. long, deep red when ripe.

Original habitat unknown, widely cultivated and escaped in tropical America. Occasionally encountered in cultivation or thickets in Panama, according to both Standley (Contr. U. S. Nat. Herb. 27:278. 1928) and Britton and Rose, but only one specimen of definitely Panamanian origin has been found during the preparation of the present account.

When the Spaniards arrived in Mexico in 1518 they found the natives using a brilliant purple, red, or orange dye, cochineal (Spanish, *cochinilla*), which they brushed from the surface of various cacti, particularly *Nopalea cochenillifera*. Their value quickly appreciated, the dye and the plants from which it was gathered were distributed by the Spaniards to other parts of their empire and to Spain itself as early as 1523.

It was not until the year 1703 that the microscope revealed the source of the dye to be a small coccid scale infesting the plants. The dye stuff was obtained by brushing the insects from the parasitized plant and roasting or boiling their bodies, which later were dried and pulverized for the vat. Until the invention of the aniline dyes cochineal was of enormous importance as a dye stuff, more than 6,000,000 pounds valued at about \$4,000,000 being produced in 1868 by the Canary Islands alone. Little use of it is found at present since the dye is not permanent.

CANAL ZONE: Bas Obispo, Verner in 1913.

2. *NOPALEA DEJECTA* (Salm-Dyck) Salm-Dyck, Cact. Hort. Dyck. 1849:64. 1850; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 1:37. 1919.

*Opuntia dejecta* Salm-Dyck, Hort. Dyck. 361. 1834.

Shrubs 1–2 m. tall, the old trunks stoutly cylindrical, very spiny, the young stem joints narrowly elliptic-oblong, to 2 dm. long, bright green, the areoles with 2–8 stout spines. Flowers dark red to pink, the perianth segments erect or nearly so, the outer deltoid, 0.5–1.0 cm. long, the inner broadly oblong-obovate, 1.5–2.0 cm. long, the hypanthium naked, broadly campanulate, about 1 cm. long and 0.7 cm. broad at the orifice; staminal filaments dark red to pink, about 4 cm. long;



ovary broadly turbinate, truncate and deeply concave, 2.0–2.5 cm. long, 1.0–1.5 cm. broad, scarcely tuberculate, the areoles unarmed or with 1–2 short slender spines. Berry turbinate, 3–4 cm. long and broad, deep red when ripe.

Commonly cultivated and escaped in tropical America, suggested as "perhaps native in Panama" by Britton and Rose. Nevertheless, during the preparation of the present account only a single herbarium specimen from Panama was discovered.

CANAL ZONE: between Empire and Culebra, Cowell 418a.

### 3. *OPUNTIA* [Tourn.] Mill.

*OPUNTIA* [Tourn.] Mill. Gard. Dict. ed. 4. 1754.

*Consolea* Lem. Rev. Hort. 1862:174. 1862.

*Tephrocactus* Lem. Cact. 88. 1868.

*Ficindica* St. Lag. in Ann. Soc. Bot. Lyon 7:70. 1880.

Succulent shrubs, small trees, and subshrubs; stems phylloid and jointed when young, the joints fleshy, compressed and oval to broadly linguiform in our species, bearing amphigenous areoles armed with hairs, glochids, and spines, very rarely unarmed. Leaves inconspicuous, acicular and fugacious. Flowers sessile, chiefly marginal upon the young joints; perianth broadly campanulate, with a short and broad hypanthium, the segments numerous, the outer progressively shorter and less petaloid than the inner, widely spreading; stamens very numerous, the filaments much shorter than the perianth, united at different levels into a shallow glandular cup, somewhat deflexed at anthesis, sensitive and inflexed upon stimulation; ovary turbinate to cylindric, concave, the areoles prominent; style slightly longer than the stamens, terete to fusiform. Fruit a fleshy berry with numerous seeds.

Very many species, all indigenous to the Americas, but some, particularly *O. ficus-indica*, introduced and escaping in the dry tropics and subtropics of the Eastern Hemisphere where their exuberent growth has made them a serious pest in many areas. In Mexico, where the genus is most diversified and frequent, various species, particularly *O. ficus-indica* and *O. tuna*, are cultivated under the name of *nopal* and the fruits, called *tunas*, eaten as a delicacy. Although tunas are marketed in the United States, chiefly in the southwest, the large usually rather insipid berries have not attained much popularity.

1. *OPUNTIA ELATIOR* Mill. Gard. Dict. ed. 8. 1768; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 1:153. 1919.

*Cactus nigricans* Haw. Misc. Nat. 187. 1803.

*Cactus elatior* (Mill.) Willd. Enum. Hort. Berol. Suppl. 34. 1813.

*Cactus tuna*  $\beta$  *elatior* (Mill.) Sims, loc. cit. sub *pl.* 1557. 1813.

*Cactus tuna*  $\gamma$  *nigricans* (Haw.) Sims, in Curt. Bot. Mag. 38: *pl.* 1557. 1813.

Densely branched shrubs to 5 m. tall, the young stem joints narrowly obovate to suborbicular, to 4 dm. long, olive-green, the areoles 2–4 cm. apart, minutely hairy and with 1–8 unequal, terete-acicular brown black-tipped spines 1–7 cm. long. Flowers about 5 cm. in diameter, deep yellow more or less tinged with red or salmon, the inner segments obovate, mucronate, about 2 cm. long; staminal

filaments 1.5–2.0 cm. long, deeply tinged with red or salmon, yellow toward the base; ovary obovoid-turbinate, about 2 cm. long and broad, the areoles unarmed or nearly so. Berry obovoid, truncate, 4–5 cm. long, deep red when ripe.

Original habitat unknown; said to be frequent in Curaçao, coastal Colombia, and Panama (Britton & Rose), but definitely known stations in Panama at present are limited to the islands of the Gulf of Panama.

PANAMÁ: Taboguilla Island, *Howe* 3792; San José Island, on rocks of beach, *Erlanson* 171; locality indefinite, *Christopherson* 207.

#### 4. ACANTHOCEREUS (Engelm. ex A. Berger) Britton & Rose

ACANTHOCEREUS (Engelm. ex A. Berger) Britton & Rose, in Contr. U. S. Nat. Herb. 12:432. 1909; in Carnegie Inst. Wash. Publ. No. 248. 2:121. 1920.

*Cereus* subsect. *Acanthocereus* Engelm. ex A. Berger, in Ann. Rep. Missouri Bot. Gard. 16: 75. 1905.

Succulent erect or clambering shrubs; stems phylloid and jointed, the joints elongate, rooting adventitiously at the tips, 3- to 5-angled, the areoles marginal on the angles, shortly pubescent and prominently spiny. Leaves very inconspicuous, acicular and fugacious or apparently wholly lacking. Flowers nocturnal, sessile, borne singly at the areoles; perianth large, subsalverform, with an elongate tube, the segments very numerous, the outer progressively shorter and narrower than the inner, widely spreading, the tube bearing several minute caducous bracts and prominent pubescent and spiny areoles; stamens very numerous, the filaments somewhat shorter than the perianth, united at progressively deeper levels to the hypanthium; ovary cylindric-ovoid, the areoles numerous and crowded, pubescent and spiny; style filiform, terete, somewhat shorter than the outer and upper stamens. Fruit a fleshy berry with numerous seeds.

A genus of about a dozen species, most frequent in Central America. A single species is recorded from Panama.

#### 1. ACANTHOCEREUS PENTAGONUS (L.) Britton & Rose, in Contr. U. S. Nat. Herb. 12:432. 1909; in Carnegie Inst. Wash. Publ. No. 248. 2:123. 1920.

*Cactus pentagonus* L. Sp. Pl. 467. 1753.

*Cactus pitajaya* Jacq. Enum. Pl. Carib. 23. 1761.

*Cereus pentagonus* (L.) Haw. Syn. Pl. Succ. 180. 1812.

*Cactus prismaticus* Willd. Enum. Pl. Suppl. 32. 1813.

*Cereus prismaticus* (Willd.) Haw. Suppl. Pl. Succ. 77. 1819.

*Cereus pitajaya* (Jacq.) DC. Prodr. 3:466. 1828.

*Cereus acutangulus* Otto, in Pfeif. Enum. Cact. 107. 1837.

*Cereus princeps* Pfeif. loc. cit. 1837.

*Cereus variabilis* Engelm. in Boston Journ. Nat. Hist. 5:205. 1845, non Pfeif.

*Cereus nitidus* Salm-Dyck, Cact. Hort. Dyck. 1849:211. 1850.

*Cereus vasmeri* Young, Fl. Tex. 276. 1873.

*Cereus dussii* K. Sch. Gesamtb. Kakteen 89. 1897.

*Cereus sirui* Weber ex Gosselin, in Bull. Mus. Hist. Nat. Paris 10:384. 1904.

Clambering terrestrial shrubs, erect when young, soon arching and rooting at the tips of the stems and forming rather extensive clones, the young stem joints

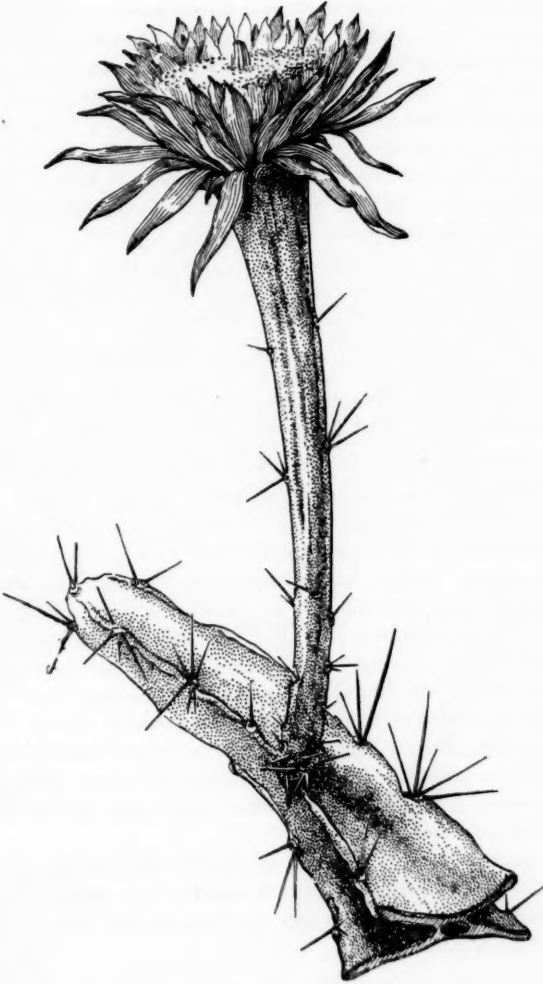


Fig. 23. *Acanthocereus pentagonus*

elongate, rather slender, 3- to 5-angled, the areoles marginal on the angles, shortly pubescent and with few to several stout straight spines. Flowers very showy, the perianth tube 15-20 cm. long, about 5 mm. in diameter at the base, abruptly dilated near the orifice into a short obconic throat about 4 cm. in diameter, armed with rather sparse spiny areoles, the lobes widely spreading, white or the outer segments more or less suffused with greenish red, the inner oblanceolate, acute to acuminate, 4-7 cm. long; ovary cylindric-ovoid, truncate, about 2 cm. long, densely armed with spiny areoles. Berry oblong-ovoid, 4-5 cm. long, deep red when ripe, persistently spiny.

Forming thickets at the margins of beaches from the keys of Florida and the coast of Texas southward to Colombia and Venezuela; sporadically introduced in the Antilles and perhaps indigenous in Guadeloupe.

CANAL ZONE: vicinity of Miraflores Lake, G. White 145. PANAMÁ: Isla Taboga, Woodson, Allen & Seibert 1490, Maxon & Valentine 6967; Bella Vista, Killip 12015; Old Panamá, Hitchcock in 1911; Gorgona Beach, G. White 154.

#### 5. HYLOCEREUS (A. Berger) Britton & Rose

HYLOCEREUS (A. Berger) Britton & Rose, in Contr. U. S. Nat. Herb. 12:428. 1909; in Carnegie Inst. Wash. Publ. No. 248. 2:183. 1920.

*Cereus* subgen. *Hylocereus* A. Berger, in Ann. Rep. Missouri Bot. Gard. 16:72. 1905.

Succulent shrubby root-climbers, frequently epiphytic; stems phylloid and jointed, rooting adventitiously at the nodes, the joints elongate, usually 3-angled, the areoles marginal on the angles, shortly pubescent and with infrequent and inconspicuous spines. Leaves inconspicuous and fugacious or wholly lacking. Flowers nocturnal, sessile, borne singly at the areoles; perianth large, broadly infundibuliform, the segments very numerous, the outer progressively shorter and less petaloid than the inner, the tube rather broad and somewhat shorter than the segments, bearing rather few conspicuous, persistent foliaceous bracts but without well-defined areoles; stamens very numerous, the filaments shorter than the perianth, united at progressively deeper levels to the hypanthium; ovary cylindric-ovoid, with few to numerous persistent accrescent foliaceous bracts but without well defined areoles; style filiform, somewhat longer than the stamens. Fruit a fleshy berry with numerous seeds.

About 20 species of Central America, northern South America, and the Antilles. Several species of *Hylocereus* are cultivated since they are amongst the most handsome of the Nightblooming *Cereuses* and some have escaped and naturalized in the tropics of the Old World.

- |   |                          |
|---|--------------------------|
| a. Areoles unarmed or with few and inconspicuous spines; perianth tube and ovary with few and distant bracts; stigma lobes dichotomous..... | 1. <i>H. MONACANTHUS</i> |
| aa. Areoles with several short stout spines; perianth tube and ovary with numerous imbricate bracts; stigma lobes entire.....               | 2. <i>H. POLYRHIZUS</i>  |

(Britton refers a sterile specimen collected by Cowell in Panama to *H. triangularis* but remarks "probably not native there, however." The stem joints of Cowell's specimen, which we have examined, are generally similar to those of *H. polyrhizus* but bear 8-10 spines at the areoles rather than the 3-5 usual for the latter species.)

Fig. 24. *Hylocereus monacanthus*

1. *HYLOCEREUS MONACANTHUS* (Lem.) Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 2:190. 1920.

*Cereus monacanthus* Lem. Hort. Univ. 6:60. 1845.

Succulent shrubby root-climbers, usually epiphytic, the young stem joints elongate, rather stout, usually sharply 3-angled, the areoles marginal on the slightly undulate angles, very minutely puberulent and occasionally with 1 to few inconspicuous spines. Flowers very showy, the perianth tube 12-15 cm. long, about 1 cm. in diameter at the base, abruptly dilating to a broadly obconic throat about 7 cm. long and broad, bearing few to several persistent foliaceous bracts 1-2 cm. long, the segments gradually spreading, greenish white, the inner rather broadly oblanceolate, subcaudate-acuminate, 12-15 cm. long; ovary cylindric-ovoid, 1.5-2.0 cm. long, persistent foliaceous bracts 0.2-1.0 cm. long, accrescent; stigma lobes dichotomous. Berry cylindric-ovoid, about 8 cm. long, unarmed save for the marcescent bases of the bracts.

Epiphytic in thickets and forested river banks, Panama and Colombia.

CANAL ZONE: Gatún, *Maxon 4689*; vicinity of Summit, *Bartlett & Lasser 17023*; Alhajuela, Chagres valley, *Pittier in 1911*. CHIRIQUÍ: east of Gualaca, alt. 500 ft., *Allen 5041*; Isla Parida, *Maxon 4904*. DARIÉN: Pinogana, *Pittier 6653*. PANAMÁ: Río Tataré, *Woodson & Schery 1021*; Bella Vista, *Killip 12030*; Tapia River, Juan Díaz region, *Maxon & Harvey 6705*; Urava Island, *Howe 31778*; Taboga Island, *Gaillard 2*.

2. *HYLOCEREUS POLYRHIZUS* (Weber) Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 2:185. 1920.

*Cereus polyrhizus* Weber, in Schum. Gesamtb. Kakteen 151. 1897.

*Cereus trigonus* var. *costaricensis* Weber, in Bull. Mus. Hist. Nat. Paris 8:457. 1902.

*Hylocereus costaricensis* (Weber) Britton & Rose, loc. cit. 186. 1920.

*Cereus costaricensis* (Weber) A. Berger, Kakteen 122. 1929.

Succulent shrubby root-climbers, frequently epiphytic, the young stem joints elongate, usually sharply 3-angled, the areoles marginal on the entire or slightly undulate angled, armed with several short stout spines. Flowers very showy, the perianth tube rather stout, 1.0-1.5 dm. long, about 1 cm. in diameter at the base, gradually dilating to a broadly obconic throat about 6 cm. in diameter at the orifice, bearing numerous persistent foliaceous bracts particularly imbricating toward the base, the segments gradually spreading, greenish white, the outermost tinged with purple, the inner rather broadly oblanceolate, acuminate, about 1.5-2.0 dm. long; ovary cylindric-ovoid, about 4 cm. long, the persistent foliaceous bracts numerous and imbricate, 1-2 cm. long; stigma lobes entire. Berry oblongoid, about 10 cm. long.

Colombia and Panama. "A common species on barren rocks, islets and cliffs along the coast [of San José Island], and frequent as an epiphyte, especially on the branches of *Bombax quinatum* in the interior of the island [I. M. Johnston, in *Sargentia* 8:217. 1949]."

PANAMÁ: San José Island, Perlas Archipelago, *Johnston 1126*, *Erlanson 172*; Old Panamá, *Rose & Rose 18506*.



Both Berger and Britton and Rose distinguish *H. polyrbizus* and *H. costaricensis* solely upon the thickness of the stem joints, whether (according to Britton & Rose) "only 3 to 4 cm. thick" or "5 to 10 cm. thick," respectively. The short descriptions of Britton and Rose are remarkably similar, differing almost solely in the position of identical adjectives. In this regard, Dr. Johnston's comments, partly quoted above, are very suggestive: "The plant varies in its form and appearance according to its particular habitat. On flat exposed rock surfaces it may be compact in growth, 1-3 dm. tall, and composed of short, stout, decumbent or ascending stems 3-6 cm. thick. Stems dangling from high branches or from the tops of cliffs usually are only 1-3 cm. thick but may become several meters or even more in length. Stems rooted on branches become flattened, as much as 10 cm. broad, and tend to wrap themselves about the support. The plant has typically 3-angled stems, but rarely 4-angled ones may be found." With such testimony, it appears entirely probable that *H. polyrbizus* and *H. costaricensis* are conspecific.

#### 6. WEBEROCEREUS Britton & Rose

WEBEROCEREUS Britton & Rose, in Contr. U. S. Nat. Herb. 12:431. 1909; in Carnegie Inst. Wash. Publ. No. 248. 2:214. 1920.

Succulent shrubby root-climbers, frequently epiphytic; stems phylloid and jointed, rooting adventitiously at the joints, the joints elongate, rather indefinitely winged, occasionally nearly terete or flattened, the areoles marginal on the wings, very inconspicuously puberulent to essentially naked, seldom with extremely few and inconspicuous spines. Leaves apparently wholly lacking. Flowers nocturnal, sessile, of mediocre size in our species, borne singly at the uppermost areoles, very broadly infundibuliform, the tube very broad and somewhat shorter than the segments, bearing few to rather numerous broad fugacious bracts and conspicuous areoles armed with numerous slender subarachnoid bristles and hairs, the segments very numerous, the outer progressively shorter and less petaloid than the inner, spreading; stamens very numerous, the filaments shorter than the perianth, inserted at progressively deeper levels within the hypanthium; ovary cylindric, bearing crowded fugacious bracts and areoles armed with numerous persistent subarachnoid bristles and hairs; style filiform, somewhat longer than the stamens. Fruit a fleshy berry with persistent bristly areoles and numerous seeds.

Three or four questionably distinct species of Panama and Costa Rica.

1. WEBEROCEREUS PANAMENSIS Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 2:215. 1920.

Succulent epiphytic root-climbers, the young stem joints elongate, 4-7 mm. thick, rather indefinitely angled or winged and occasionally flat, the areoles marginal, inconspicuously indented, very inconspicuously puberulent to naked. Flowers mediocre, the perianth tube 2-3 cm. long, about 4 mm. in diameter at the base, immediately dilating to an obconic throat about 1 cm. in diameter at the orifice, bearing several fugacious deltoid bracts and areoles armed with slender

subarachnoid bristles and hairs, the segments suberect or slightly spreading, pale yellowish orange tinged with pink, apparently occasionally white, oblong-elliptic, 1.5–3.0 cm. long; ovary oblong-turbinate, truncate, about 1 cm. long, bearing minute fugacious bracts and persistent subarachnoid-bristly areoles. Berry broadly obovoid-turbinate, 2–3 cm. long, very prominently tuberculate, bright red when ripe.

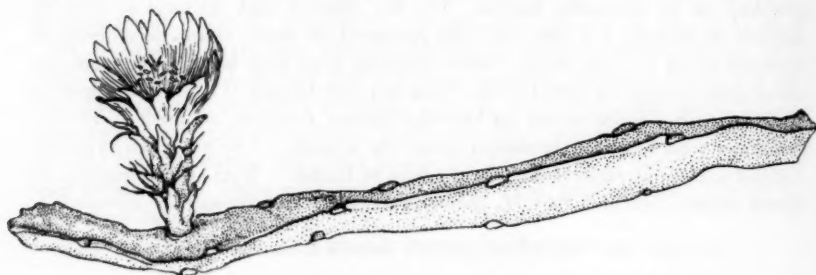


Fig. 25. *Weberocereus panamensis*

Lowland streamside forests and thickets, Panama.

COLÓN: near mouth of Río Chagres, Allen 882; along Río Fato, Pittier 3903. LOCALITY UNKNOWN: Hunter 17040, 17041.

The Hunter numbers, with only the comment "In long strands climbing over trees" have been determined previously as *Selenicereus inermis* (Otto) B. & R. They are quite sterile, however, consisting of older stems which are sharply 4-angled as a rule. Although we believe that they probably represent *W. panamensis* it is possible of course that such actually may not be the case. The flowering stem joints of *W. panamensis* which are before us are 2- to 3-angled.

#### 7. EPIPHYLLUM [Hermann] Haw.

EPIPHYLLUM [Hermann] Haw. Syn. Pl. Succ. 197. 1812; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 4:185. 1923.

*Phyllocactus* Link, Handb. Erkenn. Gewächse 2:10. 1831.

*Phyllocereus* Miq. in Bull. Sci. Phys. Nat. Bruxelles 112. 1839.

Succulent shrubby plants, usually epiphytic root-climbers; stems phylloid and jointed, usually of two intergrading types: the primary terete or subterete, usually rooting, the secondary (flowering) flattened and leaf-like, lobed or undulate, the areoles marginal, naked or rarely minutely puberulent. Leaves lacking. Flowers nocturnal or ephemeral, sessile, borne singly at the areoles; perianth usually large, infundibuliform, the segments very numerous, the outer progressively shorter and less petaloid than the inner, reflexed or spreading, the tube relatively slender, usually longer than the segments, bearing usually few and sparse, inconspicuous

bracts, usually without definite areoles; stamens very numerous, the filaments somewhat shorter than the perianth and united at progressively deeper levels to the hypanthium; ovary frequently cylindric-ovoid, with few to numerous naked or rarely minutely puberulent areoles; style filiform, somewhat longer than the stamens. Fruit a fleshy berry with numerous seeds.

About 20 species of tropical America, with the greatest concentration in Central America. These are the species of Nightblooming *Cereus* usually cultivated as house plants in the United States. A characteristic growth pattern of most Epiphyllums is the differentiation of the stems into more or less terete, rooting primary joints and flattened, leaf-like secondary joints upon which the flowers eventually are borne. Areoles appear with geometric regularity upon the secondary joints, but are erratic upon the primary. The two basic types of joint may be combined in any way: a secondary proceeding from a primary, *vice versa*, a primary from a primary, or a secondary from a secondary.

- a. Flowers very elongate and slender, the perianth tube 6 or more times longer than the segments; secondary (flowering) stem joints rather narrowly serrate, thick and callose-marginate in dessication, the areoles naked or indefinitely papillate..... 1. *E. PHYLLANTHUS*
  - aa. Flowers usually broad and massive, the perianth tube 2-3 (or less) times longer than the segments.
    - b. Flowers relatively small and inconspicuous, about 8-15 cm. long, the perianth tube 2-3 times longer than the segments; secondary stem joints rather narrowly serrate, thick and callose-marginate in dessication, the areoles naked or indefinitely papillate..... 2. *E. PITTIERI*
    - bb. Flowers large and handsome, the perianth tube less than twice as long as the segments.
      - c. Flowers about 15-25 cm. long; primary stem joints rather slender and terete.
        - d. Secondary stem joints rather narrowly serrate, thin in dessication, the areoles minutely puberulent; flowers about 15-20 cm. long. 3. *E. LEPIDOCARPUM*
        - dd. Secondary stem joints deeply crenate, the areoles minutely puberulent; flowers about 20-25 cm. long..... 4. *E. MACROPTERUM*
      - cc. Flowers about 40 cm. long; primary stem joints very stout and more or less winged or angled. (secondary stem joints unknown)..... 5. *E. GIGAS*
1. *EPIPHYLLUM PHYLLANTHUS* (L.) Haw. Syn. Pl. Succ. 197. 1812; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 4:187. 1923.

*Cactus phyllanthus* L. Sp. Pl. 469. 1753.

*Opuntia phyllanthus* (L.) Mill. Gard. Chron. ed. 8. 1768.

*Cereus phyllanthus* (L.) DC. Prodr. 3:469. 1828.

*Phyllocactus phyllanthus* (L.) Link, Handb. Erkenn. Gewächse 2:11. 1831.

*Rhipsalis phyllanthus* (L.) K. Sch. in Mart. Fl. Bras. 4<sup>2</sup>:298. 1890, in part, as to basynym.

*Epiphyllum gaillardae* Britton & Rose, in Contr. U. S. Nat. Herb. 16:240. 1913.

*Phyllocactus gaillardae* (Britton & Rose) Vaupel, in Monatsschr. Kakteenk. 23:87. 1913.

Succulent epiphytic shrubs, the primary stem joints terete, elongate, about 5 mm. thick when young, probably thicker when old, the secondary stem joints narrowly oblong-elliptic to linear-elliptic, usually obtuse to rounded at the tip, cuneately decurrent into a terete subpetiolar base, 3-5 dm. long, 2-8 cm. wide, rather narrowly serrate, thick and callose-marginate in dessication, the areoles 3-5 cm. distant, naked or indefinitely papillate, borne superficially upon the upper broad margin of the serrations. Flowers nocturnal, very elongate and slender, white,



Fig. 26. *Epiphyllum phyllanthus*

the perianth tube about 18–25 cm. long, narrowly tubular, about 3 mm. in diameter at the base, abruptly dilated into an extremely short conic throat about 8 mm. broad at the orifice, bearing very few distant and inconspicuous external bracts, the perianth segments very narrowly oblong-elliptic, acuminate, spreading, the inner about 3–4 cm. long, the ovary oblongoid, inconspicuously tuberculate. Berry oblong-turbinate, truncate, somewhat tuberculate-angulate, about 7–8 cm. long and 2 cm. broad, bright red when ripe.

Costa Rica to Brazil, Bolivia and Paraguay.

CANAL ZONE: Quebrada Culebra, Madden Lake, *Dodge & Allen 17056*. COCLÉ: hills north of El Valle, alt. 1000 m., *Allen 2334*; Penonomé, *Williams 423*. COLÓN: Porto Bello, *Pittier in 1912*. DARIÉN: headwaters of Rio Chico, alt. 500–750 ft., *Allen 4600*. PANAMÁ: vicinity of Pacora, alt. 40 m., *Allen 2241*; Juan Díaz, *Maxon & Harvey 6706*.

2. *EPIPHYLLUM PITTIERI* (Weber) Britton & Rose, in Contr. U. S. Nat. Herb. 16:258. 1913.

*Phyllocactus pittieri* Weber, in Bois, Dict. Hort. 2:957. 1898.

Succulent epiphytic shrubs, the primary stem joints terete or weakly angulate, 5–10 mm. thick when young, probably thicker when old, the secondary stem joints linear-elliptic, acute to obtuse at the tip, decurrent to a short terete subpetiolar base, about 2–10 dm. long and 2–6 cm. broad, rather narrowly serrate, thick and callose-marginate in dessication, the areoles 3–6 cm. distant, naked or indefinitely papillate, borne superficially upon the upper broad margin of the serrations. Flowers nocturnal, relatively small and inconspicuous, white, the perianth tube about 6–10 cm. long, narrowly tubular, about 4 mm. in diameter at the base, abruptly dilated into an extremely short conic throat about 7 mm. broad at the orifice, bearing few and distant inconspicuous petaloid bracts, the perianth segments linear-elliptic, acuminate, spreading, the inner about 4–5 cm. long, the ovary narrowly oblongoid, inconspicuously bracteate and tuberculate. Berry oblongoid, about 2 cm. long, deep red when ripe.

Costa Rica and Panama.

BOCAS DEL TORO: vicinity of Chiriquí Lagoon, *Von Wedel 1294*; Water Valley, *Von Wedel 1528, 1580, 1768A*; Quebrada Nigua, Almirante Bay, *Von Wedel 7*; Garay Creek, *Von Wedel 2630*. CANAL ZONE: Drayton Trail, Barro Colorado Island, *Sbattuck 603*. CHIRIQUÍ: forest, Puerto Armuelles, *Davidson 1189*.

3. *EPIPHYLLUM LEPIDOCARPUM* (Weber) Britton & Rose, in Contr. U. S. Nat. Herb. 16:257. 1913.

*Phyllocactus lepidocarpus* Weber, in Bull. Mus. Hist. Nat. Paris 8:462. 1902.

Succulent epiphytic shrubs, the primary stem joints weakly 3-angled, up to 1 cm. thick when young, becoming terete and thicker when old, the secondary stem joints oblong- to narrowly ovate-elliptic, obtuse at the tip, decurrent to a very short weakly angled subpetiolar base, about 2–7 dm. long and 3–7 cm. broad, rather narrowly serrate, remarkably thin and more or less venose in dessication, the areoles 4–5 cm. distant, minutely puperulent, borne superficially upon the upper

broad margin of the serrations. Flowers nocturnal, rather broad and handsome, white with the outer segments flushed with rose, the perianth tube about 7–8 cm. long, tubular, about 4 mm. in diameter at the base, rather gradually dilating to a narrowly conical throat about 1.5 cm. broad at the orifice, bearing a few inconspicuous deciduous linear bracts subtending puberulent areoles toward the base, the segments 7–8 cm. long, the outer linear, flushed with rose, the inner narrowly obovate-elliptic, white, the ovary narrowly turbinate, bearing crowded persistent ovate bracts and conspicuous puberulent areoles. Berry turbinate-fusiform, occasionally conspicuously beaked, 6–9 cm. long, 2–4 cm. thick, covered with the accrescent hyaline bracts and puberulent areoles, purplish pink when ripe.

Highland Costa Rica and western Panama, epiphytic or upon rocks.

CHIRIQUÍ: valley of the upper Río Chiriquí Viejo, vicinity of Monte Lirio, alt. 1300–1900 m., *Seibert 206*; Bajo Chorro, Boquete District, alt. 6000 ft., *Davidson 253*.

A species particularly noteworthy because of its peculiar scaly fruits.

4. *EPIPHYLLUM MACROPTERUM* (Lem.) Britton & Rose, in *Carnegie Inst. Wash. Publ. No. 248*. 4:193. 1923.

*Phyllocactus macropterus* Lem. *Illustr. Hort.* 11: Misc. 73. 1864.

*Phyllocactus thomasiannus* K. Sch. in *Monatsschr. Kakteenk.* 5:6. 1895.

*Phyllocactus costaricensis* Weber, in *Bull. Mus. Hist. Nat. Paris* 8:463. 1902.

*Phyllocactus macrocarpus* Weber, loc. cit. 464. 1902.

*Epiphyllum costaricense* (Weber) Britton & Rose, in *Contr. U. S. Nat. Herb.* 16:256. 1913.

*Epiphyllum thomasiannum* (K. Sch.) Britton & Rose, loc. cit. 259. 1913.

Massive succulent epiphytic shrubs, the primary stem joints terete or weakly 4-angled and 5–8 mm. thick when young, becoming stouter and terete in age, the secondary stem joints narrowly obovate- to oblong-elliptic, obtuse to rounded at the tip, broadly decurrent to a short weakly angled subpetiolar base, about 6–8 dm. long and 5–10 cm. broad, rather broadly and regularly crenate, rather thin and venose in dessication, conspicuously callose-marginate, the areoles 2–5 cm. distant, minutely puberulent, borne within the deep indentations of the crenations. Flowers nocturnal, very large and handsome, the perianth tube 12–15 cm. long, tubular, arcuate, about 6 mm. broad at the base, gradually dilating to a conical throat about 3 cm. broad at the orifice, pale greenish rose, bearing rather conspicuous persistent subfoliaceous bracts, the segments about 8–12 cm. long, slightly spreading, the outer linear-lanceolate, pale greenish rose, the inner obovate-elliptic, white; ovary oblongoid, about 3–4 cm. long, bearing many subfoliaceous bracts. Berry oblong-fusiform, usually beaked, about 10–12 cm. long and 4–5 cm. thick, slightly tuberculate at the minutely puberulent areoles, red when ripe.

Costa Rica and Panama, epiphytic and upon rocks, apparently usually at low altitudes.

BOCAS DEL TORO: vicinity of Chiriquí Lagoon, *Von Wedel 1164*; Snapper Point, *Von Wedel 2639*; Water Valley, *Von Wedel 736*; Shepherd Island, *Von Wedel 2722*. CHIRIQUÍ: Puerto Armuelles, *Davidson 1190*.

An extremely showy plant, but surpassed by the one which follows:



5. *EPIPHYLLUM gigas* Woodson & Cutak, spec. nov.

Frutices succulenti scandentes radicanes, ramis ut dicitur ultra pedes centum in longitudinem metientibus; articulis rami radicanibus validissimis ancipitibus leviter undulatis nostris 2-3 cm. crassis; articulis florigeris infelicitur ignotis. Flores maximi speciosissimi ut creditur albi noctiflori; perianthii tubo ca. 22-25 cm. longo basi ca. 7 mm. lato apicem versus gradatim dilatato ostio ca. 2.5-3.0 cm. diam. extus bracteas linearis paucas gerente; perianthii segmentis exterioribus linearibus longe acuminatis 15 cm. longis vel ultra patulis, interioribusne latioribus in exemplo nostro vix bene visis; ovario late cylindrico ca. 1.5 cm. longo inconspicue bracteato areolas parvas paucas minute puberulentes gerente. Bacca ignota. Species inter species generis jam cognitatas omnibus partibus longe maxima.

PANAMÁ: Cerro Trinidad, alt. 800-1000 m., climbing rock faces of main peak, Oct. 20, 1946, P. H. Allen 3772 (Herb. Missouri Bot. Gard., HOLOTYPE).

This is a tremendous species, far surpassing in size of all parts any other known *Epiphyllum*; as such it is impossible to ignore, even though one quite naturally would desire the flowering stem joints and fruits for a complete description. The rather regular undulations of the primary stem joints and the puberulent areoles of the ovary suggest an affinity with *E. macropterum* and *E. oxypetalum*. Mr. Allen's statement that the holotype specimen was a "giant liana, to several hundred feet in length" might seem totally incredible were it not for the gigantic flower which he preserved.

8. *WITTIA* K. Sch.

*WITTIA* K. Sch. in Monatsschr. Kakteenk. 13:117. 1903; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 3:206. 1923.

*Pseudorbipsalis* Britton & Rose, loc. cit. 4:213. 1923.

Succulent shrubby root-climbers, usually epiphytic; stems phylloid and jointed, usually of two intergrading types as in *Epiphyllum*: the primary terete or weakly winged, usually rooting, the secondary (flowering) flattened and leaf-like, lobed or undulate, with marginal areoles covered with few to several minute scales and indefinitely papillate or naked. Leaves lacking. Flowers ephemeral (or nocturnal?), sessile, borne singly at the areoles; perianth mediocre or relatively small, tubular to tubular-salverform or campanulate, the tube about as long as the segments or shorter, bearing a few inconspicuous deltoid bracts, the segments about 10-15, erect or spreading; stamens about 30-45, the filaments few to several times longer than the anthers, inserted at progressively deeper levels within the perianth tube, the outermost conspicuously shorter than the innermost; ovary ovoid-fusiform, minutely tuberculate-bracteate. Fruit a fleshy berry with rather few seeds.

It is extremely difficult to justify the separation of *Pseudorbipsalis* from *Wittia* upon the basis of our scanty herbarium material, and surely it is nearly impossible to do so even from the meagre descriptions and rather irrelevant comments of

Britton and Rose. Granted that there is an obvious transition between the subtribes Epiphyllanae and Rhipsalidanae, the purpose of illustration as well as that of convenience would be served better by fewer gradient genera than those recognized by Britton and Rose.

Britton and Rose enumerate two species each for *Wittia* and *Pseudorhipsalis*. In addition to the two species in Panama, *W. amazonica* is known from extreme northeastern Peru and adjacent Colombia, and *Ps. alata* from Jamaica.

- |  |                           |
|--|---------------------------|
| a. Flowers tubular-salverform, white flushed with rose, the perianth segments widely spreading; flowering stem joints narrowly repand..... | 1. <i>W. HIMANTOCLADA</i> |
| aa. Flowers tubular, deep pink tipped with lavender, the perianth segments erect; flowering stem joints narrowly serrate.....              | 2. <i>W. PANAMENSIS</i>   |

1. *WITTIA himantoclada* (Roland-Gosselin) Woodson, comb. nov.

*Rhipsalis himantoclada* Roland-Gosselin, in Bull. Soc. Bot. France 55:694. 1908.

*Wittia costaricensis* Britton & Rose, in Contr. U. S. Nat. Herb. 16:261. 1913.

*Pseudorhipsalis himantoclada* (Roland-Gosselin) Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 4:213. 1923.

Succulent epiphytic root-climbers, the primary stem joints terete or weakly winged, up to about 1.5 m. long, the secondary stem joints narrowly lanceolate or oblanceolate, 2-5 dm. long, 1-5 cm. broad, obtuse to rounded at the tip, cuneately decurrent into a subpetiolar base, narrowly repand, thick and coriaceous in dessication, the areoles 1-2 cm. distant. Flowers tubular-salverform, white flushed with rose or orange without, the perianth tube about 5-6 mm. long, about 3 mm. in diameter at the base, the perianth segments 10-15, narrowly elliptic to linear, about 1 cm. long and up to 3 mm. broad, widely spreading; stamens about 45, slightly exserted to barely included; ovary broadly cylindrical, about 7 mm. long, deep rose. Berry unknown.

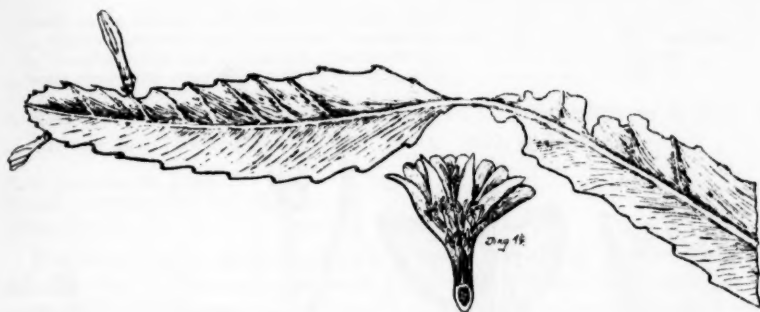
Costa Rica and Panama.

COCLÉ: north rim of El Valle, Allen 1897.

2. *WITTIA PANAMENSIS* Britton & Rose, in Contr. U. S. Nat. Herb. 16: 241. 1913; in Carnegie Inst. Wash. Publ. No. 248. 4:207. 1923.

Succulent scandent shrubs, epiphytic or upon rocks, the primary stem joints terete or weakly ancipitous, the secondary stem joints very narrowly oblong-lanceolate, rounded at the tip, cuneately decurrent into a very short subpetiolar base, 3-5 dm. long, 3-5 cm. broad, very narrowly and closely cuneate-serrate, thick and callose-marginate in dessication, the areoles 1.0-2.5 cm. distant, naked or indefinitely papillate beneath the minute imbricate scales, borne superficially upon the upper margin of the narrow serrations. Flowers ephemeral, rather small, tubular, pink tipped with lavender, the perianth tube about 1.5 cm. long, about 2 mm. in diameter at the base, scarcely dilated toward the orifice, the perianth segments about 10, about 1 cm. long, erect or essentially so; ovary about 3 mm. long, minutely tuberculate-bracteate. Berry not seen.

Eastern Panama; Colombia and Venezuela.

Fig. 27. *Wittia panamensis*

DARIÉN: Marraganti, Williams 698; trail between Pinogana and Yaviza, Allen 278.  
 PANAMÁ: Chepo, Pittier 4571. SAN BLAS: Caledonia, Elmore 140.

*Wittia panamensis* is distinguished from *W. amazonica* by Britton and Rose solely upon the fruit, whether "smooth" or "roughened by small tubercles" respectively. I have seen no fruit of *W. panamensis* as yet, but the ovaries of the flowers certainly are minutely tuberculate and I rather suspect that the fruit of the two species may have much in common.

#### 9. RHIPSALIS Gaertn.

RHIPSALIS Gaertn. Fruct. Sem. 1:137. 1788; Britton & Rose, in Carnegie Inst.

Wash. Publ. No. 248. 4:219. 1923, nom. conserv.

*Hariota* Adans. Fam. 2:243. 1763, nom. rejic.

Rather slender succulent root-climbers, usually epiphytic; stems phylloid and jointed, terete or essentially so in our species, the areoles spiral, naked to abundantly hirsute or bristly. Leaves lacking. Flowers very small, sessile or somewhat sunken within the stem joints, solitary; perianth rotate, the segments free or essentially so, relatively few, sometimes only 5, usually spreading; stamens about twice as many as the perianth lobes, the filaments inserted on the margin of the hypanthium. Berry small, usually white, with rather few small seeds.

A perplexing genus of 50 or more species in tropical and subtropical America; also with several species described from the Old World, at least some of which may be introduced from America. Known as Mistletoe Cactus in the United States.

Besides the ubiquitous *Rh. cassutha* there are two very distinct species in Panama which are known only from sterile specimens. Both probably are undescribed, but of course cannot be provided with names until flowering plants are found.



Fig. 28. *Rhipsalis cassytha*

- a. Sterile areoles minutely puberulent to essentially naked.  
 b. Flowering areoles minutely puberulent to essentially naked..... 1. *RH. CASSYTHA*  
 bb. Flowering areoles very conspicuously floccose-hirsute..... 2. *RH. SP.*  
 aa. Sterile areoles with conspicuous tufts of spreading bristles..... 3. *RH. SP.*

1. *RHIPSALIS CASSYTHA* Gaertn. Fruct. Sem. 1:137. 1788; Britton & Rose, in Carnegie Inst. Wash. Publ. No. 248. 4:225. 1923, as *cassutha*.

*Cactus pendulus* Sw. Prodr. 77. 1788.

*Rhipsalis parasitica* Haw. Syn. Pl. Succ. 187. 1812.

*Hariota cassytha* (Gaertn.) Lem. Cact. Gen. Nov. Sp. 75. 1839.

Pendulous, usually epiphytic succulents up to 9 m. long; stem joints terete, dichotomous or in false whorls, yellowish green, about 2-3 mm. thick when young, the areoles very inconspicuous, glabrous to minutely puberulent. Flowers lateral, solitary, greenish white, the perianth segments about 2 mm. long. Berry globose, white (rarely pink), about 5 mm. in diameter.

Throughout tropical America, apparently also in Ceylon and tropical Africa. Very frequent in Panama.

BOCAS DEL TORO: Water Valley, *Von Wedel 649, 1670*; Little Bocas, *Von Wedel 2529*; Pumpkin River, *Von Wedel 2584*; Isla Colón, *Von Wedel 2024*. CANAL ZONE: vicinity of Madden Dam and Alahuella, alt. 80-100 m., *Hunter & Allen 787*; Barro Colorado Island, *Shattuck 447*; Bas Obispo, *Verner s. n.*; Gatún Lake, *Rowlee & Rowlee 405*; Balboa, *Standley 28546*.

## 2. *RHIPSALIS SP.*

This species has stem joints which are about half as thick as is usual for those of *Rb. cassytha*. The sterile areoles are glabrous or essentially so, but the young flowering areoles are covered with exceedingly dense tufts of yellow hairs 2-3 mm. long. If this is a species of series *FLOCCOSAE*, as seems probable, it is the most northern representative of it.

BOCAS DEL TORO: vicinity of Chiriquí Lagoon, *Von Wedel 1393*.

## 3. *RHIPSALIS SP.*

This little plant resembles a *Lycopodium* at first glance. It is juvenile, apparently, and the stems, which are somewhat thicker than those of *Rb. cassytha*, have the sterile areoles beset with conspicuous tufts of spreading bristles 1-2 mm. long. Its general aspect agrees in general with the illustration of *Rb. aculeata* given by Britton & Rose (in Carnegie Inst. Wash. Publ. No. 248. 4: *pl. xxiv, fig. 8*). On the other hand, a good many *Rhipsalis* seedlings appear bristly or spiny and later more mature growth becomes almost glabrous.

BOCAS DEL TORO: Pumpkin River, *Von Wedel 2572*.







